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THE YOUNG STETHOSCOPIST*

REGINALD FITZ, M.D.

BOSTON

WHEN I visited Cleveland a few months ago and looked at the Surgeon General's books housed in the Allen Memorial Library, I happened to meet an old friend. It was a small and unobtrusive volume called *The Young Stethoscopist*, apparently as much at home in Cleveland as in Boston, and now proudly sporting, as if it were a military decoration, the bookplate of the Army Medical Library. I felt unaccountably pleased that Boston should be represented in such a magnificent collection, and found myself wondering how it happened that a Boston book printed nearly a hundred years ago and as obsolete as a Model T Ford should still be considered of sufficient distinction as to be so beautifully cared for in the Nation's most important medical library.

I found it necessary to go back a long time to discover a plausible answer, back to the days when Bostonians† were a race of people dominated by a Brahmin caste, when the State House was the hub of the solar system and when medicine was held firmly in the hands of Harvard College through the unyielding influence of the Warrens, James Jackson and their friends.

The Harvard Medical School in the early nineteenth century had scarcely become established on its own feet, and there was still a good deal of informality in its way of doing things. Yet even when it opened in 1783, John Warren laid plans for the future, and by 1821, when the Massachusetts General Hospital received its first patient, the Warren dynasty was fairly well ensconced: John C. Warren in the chair of surgery, James Jackson in theory and practice, Walter Channing in midwifery and Jacob Bigelow in materia medica — Brahmins, Harvard College graduates, a closed corporation and as cozy as peas in a pod. The wonder is that the school ever survived such inbreeding.

From an internist's viewpoint, James Jackson was the most interesting member of this group. He was a strong man, eager to see the Harvard Medical School go forward and equally eager for the youthful Massachusetts General Hospital to do things. He had been abroad and knew something of the organization of a modern teaching hospital, and no doubt hoped that some day the hospital might attain a high position. Therefore from the very beginning he attempted to make all that he did there as lively as possible, and among other innovations introduced, as promptly as he could, clinical teaching at the bedside.

The teaching at the hospital in those early days also appears to have been conducted on an informal basis. There was but one physician, and one surgeon, on the staff — Jackson and Warren — and also a resident apothecary and house surgeon who were medical students appointed by the Trustees on recommendation by the physician and surgeon. As can be surmised, the presence of medical students "to see the practice of the House" was encouraged so long as they "demeaned themselves correctly and orderly"; clearly a good hospital not only must take care of sick people but must also serve as a teaching center.

It was obvious that the physician and surgeon might be prevented from making ward rounds every day, so provisions were made for appointment of assistants who could carry on the work of their chiefs when necessary. Walter Channing was made assistant physician in 1821, and John B. Brown assistant surgeon in 1823. At first there were only 53 medical and 40 surgical beds in the institution, and during the opening year about 200 cases were followed with the gratifyingly large surgical experience of 40 operations.

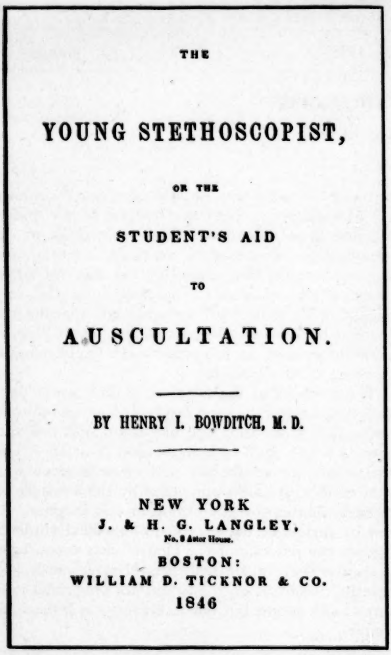
In the spring of 1821, the *New England Journal of Medicine and Surgery* published a carefully written review of Laennec's recent book on physical diagnosis.[1] This was an article of more than fifty pages and appeared in the April and July numbers. It ended by stating:

> We may be permitted to say that the analysis we have made of this work has cost us much labour. But it would be injustice to Laennec not to say that our review gives a very imperfect representation of the learning and original observations which his work displays. We have already given some opinion respecting the value of the stetho-

*Presented at a dinner of the Honorary Consultants to the Army Medical Library, Washington, D. C., October 5, 1944.

†A hundred years ago the Boston Dispensary, with no trace of self-consciousness, classified its patients racially, as Bostonians, Americans, Hibernico-Americans and Other People.

scope. The continued use of this instrument has satisfied us more and more of the benefits which may be attained by it; but we believe it must be used a long while before so much can be ascertained by others, as has been by the inventor. On this point it may be proper to add


THE

YOUNG STETHOSCOPIST,

OR THE

STUDENT'S AID

TO

AUSCULTATION.

BY HENRY I. BOWDITCH, M. D.

NEW YORK
J. & H. G. LANGLEY,
No. 8 Astor House.

BOSTON:
WILLIAM D. TICKNOR & CO.
1846

FIGURE 1. *Title Page from* The Young Stethoscopist (*Harvard Medical Library*).

that much must depend on the perfection of the sense of hearing. A man with a nice ear for music would probably discover much more by this instrument than one who has not that organ so delicately constituted.

Obviously someone in Boston obtained a copy of Laennec's book shortly after its publication and started to work on physical diagnosis by his methods. The review* is unsigned, and the owner of the original copy that was the pioneer in Boston cannot be identified. It is known, however, that Dr. Jackson was much interested and that as soon as possible after this review was printed he began to teach auscultation and percussion in the Harvard Medical School. To prove this, in 1827 there appeared from his pen for the use of his students a textbook on the theory and practice of physic.[3] He has some interesting things to say about these methods.

In the investigation of the *causes* of dyspnoea, as well as of other symptoms in thoracic diseases, much may be learnt by attending to the effects of position and motion; also by percussion and by *auscultation*, mediate or immediate. . . .

The practice of *percussion* is founded on the following circumstances. When the air is admitted fully into the lungs, the thorax resounds on percussion like a hollow cask, with the exception of certain regions. When the air is not permitted to enter any particular part of the lungs, a blow over that part will produce a flat sound. The extent, over which this flat sound is perceived, will determine the extent to which the air-vessels are compressed or obstructed; and if the compressing cause be moveable, such as a fluid in one of the cavities of the pleura, this may be discovered by attending to the effects of a change of position, as regards the parts affording the flat sound.

The use of the *stethoscope* is founded on the following circumstances. The motion of the air in the lungs, with all the obstacles to the regular passage of it, is productive of sounds, which may be heard by placing the ear on the chest. So also is the motions of the heart capable of being ascertained by the ear. But these sounds in the thorax may be ascertained most conveniently through a cylinder of wood or of other material; one end of the instrument being rested on the chest, and one end being applied to the ear. When such an instrument is used the auscultation is mediate; when the ear is applied to the thorax the auscultation is immediate. If the instrument be applied when the patient is speaking, a tremor is perceived over healthy lungs; but when the lungs are diseased, or compressed, the changes are manifested by certain peculiar changes in the sounds transmitted through the instrument.

It would certainly be very useful to distinguish during life, the different organic changes [in the heart]. . . . We can however with some degree of assurance, distinguish the following affections, viz: hypertrophia of the heart, dilatation of its cavities, and these two combined. In making these distinctions, much aid may be derived from the use of the stethoscope. We may also sometimes distinguish diseases of the valves and aneurism of the aorta. Dropsy of the pericardium is not easily distinguished.

For a teacher growing no younger year by year and with hearing becoming less acute, it was excessively hard to improve one's skill in physical diagnosis by the method of self-teaching. The obvious answer was to send to France to learn the new technic a procession of Bostonians from the right kind of families so that, as Dr. Jackson expressed it, these young men when they returned could put their ears in use at his hospital.

The leader of this procession was James Jackson, Jr., who left the medical school as an undergraduate in 1831; he was soon followed by Henry Ingersoll Bowditch, Cliver Wendell Holmes and Mason Warren. There is something appealing about young Jackson's first letter home and his father's reply to it.† From Paris, shortly after he arrived there, James Jackson, Jr., wrote:

> I feel almost disposed to cover a sheet or two in enumerating the difficulties of auscultation. If Laennec has added an important aid to our insufficient means of exploring diseases of the chest, he has, at the same time, rendered the study of those diseases more difficult, more laborious I would say, to the learner. . . .
>
> By the by, you would be much surprised, my dear father, to see how much more the immediate auscultation is used here, than the mediate. There is one other point, we are too apt to neglect at the M. G. H. It is the examination of the dorsal region. The French examine the back more than the front; we do the contrary; both err, but they the least.

*There is a hint in it that Dr. Jackson wrote it, for he appears to have found auscultation a difficult art. In a letter dated March 5, 1833, he[2] said, "My ears are old and were not trained early."

†Many delightful letters between James Jackson, Jr., and his father can be found in Putnam's *A Memoir of Dr. James Jackson* (Boston and New York: Houghton, Mifflin and Company, 1906) and in Jackson's *A Memoir of James Jackson, Jr., M.D.* (Boston: I. R. Butts, 1835).

Dr. Jackson, Sr., answered:

> On the first I received yours of the 28th Oct. It is on the use of the stethoscope, its difficulties. I believe that I wrote you in the same month stating the difficulties on my part. I scarcely expect to overcome them, yet I expect you to do it. It is incomparably easier for you than for me, and you will have great opportunities abroad.

As everyone knows, James Jackson, Jr., died before he had any opportunity to bring to medicine more than great promise. It fell to his successors to accomplish his father's aims.

Henry Ingersoll Bowditch was properly bred to take a part in such a plan.[4] His father was a distinguished scientist and a former Harvard overseer, his mother a Miss Ingersoll and his birthplace Salem. He went to Harvard College and the Harvard Medical School, he served in his student days for a year as house surgeon in the Massachusetts General Hospital, and finally, in 1832, he followed James Jackson, Jr., to Paris.

He stayed in Paris for two years, there coming under the influence of the teachings of Laennec through such masters as Chaumel, Andral and particularly Louis. He walked the wards with these men, listened to their lectures, copied their mannerisms and for Louis developed the highest admiration. From him he learned three lessons of fundamental importance to his later life: the art of physical diagnosis, the importance of clinicopathological correlation and, above all, the realization that the edifice of medicine reposes entirely on facts that are well and carefully observed.

In Paris, along with Jackson and Holmes, Dr. Bowditch had the honor of election to the Society of Medical Observation. This was a club formed by a group of students under the presidency of Louis. It was the aim of this club to make its members observers of disease. It required each one to go through a kind of initiation in the recording of medical observation, and it demanded that such observations as were made should be submitted to the criticism of the entire membership. Those who belonged were bright and ambitious youngsters. They met each week. They kept notes of what they heard, and each was prepared to pounce on even the most trivial omissions in what the speaker of the evening had to say. Louis summed up their results by criticizing the reader and his critics and by adding anything to the subject under discussion that he chose.

Dr. Bowditch's recollection of his own first performance before this club is still vivid. He recalls his diffidence at attempting to speak in a foreign language at such a gathering, the disparaging attitude of his friends toward his paper and how Louis finally annihilated him by pointing out that his presentation was incomplete since he had discussed only half the subject. Yet experiences of this sort were invaluable and not in the least humiliating; on the contrary, they were inspiring, for although they were arduous, they were never malicious, they represented honest endeavor, and they were controlled by the guiding hand of a great master.

Dr. Bowditch came back to Boston in the fall of 1834. The organization of the Massachusetts General Hospital and the Harvard Medical School was such that no place could be found for him immediately, and so he occupied himself as sort of a voluntary teacher* until his innings were due. One of the first things that he did was to found the Boston Society of Medical Observation.† Its opening meeting was held on March 28, 1835, when Dr. Bowditch and four students organized themselves into "a society for the purpose of collecting and reading detailed observations of cases of diseases as they presented themselves at the Massachusetts General Hospital and elsewhere in Boston." Dr. Bowditch spoke about the parent society in Paris and its usefulness; the members pledged themselves to follow the Parisian model and to meet for two hours one evening each week. At once they elected Louis an honorary member; and before long they were an active club with an increasing list of distinguished members.

Dr. Bowditch took great pride in the society. The early records make interesting reading; it was here that trichinosis was first described in Boston; a curious epidemic of pulmonary disease among horses was studied; and the Massachusetts General Hospital was informed — to its everlasting benefit — that its records were of no particular value from the viewpoint of advancing clinical knowledge. It was here, more than fifty years before appendicitis was named, that a bizarre case was reported concerning a young woman who after breakfast one morning was suddenly seized with a violent colic complicated by chills and fever. As Dr. Bowditch said, the suddenness of the attack, the chills and fever and the colicky pain made the diagnosis difficult. The disorder did not appear to be strangulation of the intestine nor to originate from a diseased liver. What could be the significance of the fact that the region around the cecum was acutely sensitive? It was here that the clinical picture of diaphragmatic hernia was clearly drawn and that thoracentesis of the chest as a means of treatment for hydrothorax was suggested; and it was here on one memorable occasion that Dr. Bowditch read a paper on hippophagy, defending the use of horse meat as an edible viand — perhaps accounting for the existing predilection of the Harvard Faculty Club to serve horse steak at dinner as a particular delicacy. Indeed, the Boston Society for Medical Observation played a part in making medical history.

In 1838, Dr. Bowditch received his first appointment at the hospital and was given a post that was

*In the catalogues of the Harvard Medical School of that era he is listed as "instructor," which was not a formal appointment.

†The early records of the Boston Society of Medical Observation are in the Boston Medical Library.

probably more to his taste than any other. The hospital had grown considerably since it opened and since that memorable day in 1825 when General Lafayette, accompanied by the governor and the lieutenant governor, had driven to the Bulfinch Front and after being properly received by the president and members of the Board of Trustees, flanked by the physicians and surgeons, inspected the building. Business was so brisk that an admitting physician had proved necessary, a doctor who would see the patients before entry, determine their condition, decide whether they were properly admissible, do whatever outpatient work was indicated and, more important still, be responsible for all pathological examinations of the institution. Dr. Bowditch felt pleased to receive this appointment, for it gave him an opportunity to put into practice some of his Parisian training. One of his students said that he now regularly spent an hour each morning examining patients, at the same time teaching physical diagnosis and giving his young assistants every opportunity to practice this art.* If an autopsy was to be performed, he would devote the entire afternoon to it, appointing a student assistant and making the medical house pupil take notes from dictation so that the record might be as complete as possible.

Apparently this method of teaching met with the approval of the president and fellows of Harvard College. For the catalogue of 1841–42 for the first time announced that the course in medicine embraced lectures given at the medical college on the general principles of pathology and treatment and clinical lectures given at the Massachusetts General Hospital. The latter were given twice a week and occupied two hours each. The catalogue states, "Students have an opportunity of visiting all the cases and of observing and learning the symptoms and treatment of each case and particularly of the exploration of the body for the physical signs of disease by *palpation*, *auscultation* and *percussion*." In this fashion the use of the stethoscope was finally made respectable in Boston and all students were taught how to use it.

Any teacher who has a hand in developing a new course at the Harvard Medical School is likely to wish to prepare his own textbook. It is not surprising, therefore, that in the summer of 1844, Dr. Bowditch wrote a friend: "I sit most of the time in the front parlor preparing my book on auscultation, which I believe I am fairly engaged in now," nor that in December, 1845, the *Boston Medical and Surgical Journal* prepared a welcome for *The Young Stethoscopist*. "We understand," it stated, "that Dr. Bowditch of this city, has in press a new work, under the above title, on the Physical Signs of Diseases of the Chest. It is intended as an aid to students, and to physicians resident in the country. About the middle of January it will, probably, be ready for the trade."

The Young Stethoscopist came out on time, a slim volume full of wisdom and practical hints on how to examine the chest properly. Henry J. Bigelow[5] reviewed it shortly after its birth and remarked of Bowditch and his work: "He has booked Laennec up to date and has compressed his genius, as the fisherman in the *Arabian Nights* did his, into a prodigiously small volume. We commend it to auscultors and to non-auscultors."

The Young Stethoscopist proved popular and went through two editions. It is one of the first books on auscultation and percussion by an American writer to be published in this country, and it has an interesting background, relating together Laennec, Louis, the Jacksons and through them all subsequent American auscultors. For these reasons it is more than a bibliographic curiosity and has well earned a place in the Army Medical Library. Besides this, there is reason to imagine that the book is unique: as a possible appendage, it has a humorous Back Bay postscript that forever makes its contents point a significant moral to young stethoscopists.

The Boston Society for Medical Improvement was established in 1828.[6] It started simply — a gathering of colleagues who met regularly to talk shop. But from the beginning the society developed a delightful tradition that I am pleased to observe has been copied by the Honorary Consultants to the Army Medical Library — the tradition of an annual dinner. The dinner was an occasion of geniality where men talked and laughed, sang songs or even poetized if the spirit moved them. When Dr. Holmes was secretary he left a pleasant account of what went on:

> **At seven o'clock the Society disposed itself at table animated by the presence of the dinner, which, by its outward arrangement and intrinsic excellence, did honor to the taste and judgment of the provider. . . . No incident occurred to interrupt the festivities of the evening, with the exception that a couple of our most efficient members were interrupted for a short time by accidents too frequent on these occasions. An amiable indiscretion, dating undoubtedly from some bright May morning, was visited upon the heads of Drs. Ware and Adams, by a midnight call into the midst of a February snowstorm. The hilarity of the company was temporarily diminished, and the census of the city permanently increased during their absence.**

As the years rolled by, the annual dinner came to be anticipated with increasing eagerness; one was sure of a good meal, an evening of relaxation, speeches that were neither too long nor too dull and a poem by Dr. Holmes.

It was at the dinner in February or March of 1846,† I suspect, that Dr. Holmes introduced the "Stethoscope Song." *The Young Stethoscopist* was then brand new but already old enough to have made

*Dr. Bowditch still had no formal appointment in the medical school so that his teaching must have been largely a voluntary effort.

†This date is a matter of guesswork. No student of Dr. Holmes has determined accurately when the "Stethoscope Song" was written or first sung. T. F. Currier, who knows as much as anyone about the matter, says that its first printed appearance, so far as he can ascertain, was in the 1849 edition of the doctor's poems, which appeared in November, 1848.

a little noise around Boston. To poke fun at it in the midst of a group of intimate friends would have amused Dr. Holmes, would have been timely and was the sort of thing he knew how to do so well and gracefully.

The tune that was used is lost, but the words remain. The story of the song is simple enough; it is about a young Boston doctor who procured a new stethoscope, with an ivory cap and a lovely polish. Unfortunately a couple of flies housed themselves in it so that whenever he used the instrument he heard noises that would have perplexed Laennec; and he made improbable diagnoses that were invariably wrong. At last six young maidens, who were growing pale and had taken to sighing or to eating such things as coal or chalk, consulted him. Naturally, because of his zeal in using the stethoscope, the young doctor was not interested in anything so commonplace as looking at them, but he heard such ominous buzzings in their chests when he listened that he felt sure they all must die. However, before this happened, six young men fell in love with the maidens and married them, and at once they grew well.

In these days when we have, besides the stethoscope, the x-ray, the cardiogram, a method for visualizing the heart sounds, new drugs, allergy, blood chemistry and metabolism tests, all combining to make diagnosis complicated and common sense obscure, the last verse of the "Stethoscope Song" is worth remembering.

Now use your ears, all you that can,
But don't forget to mind your eyes,
Or you may be cheated, like this young man,
By a couple of silly, abnormal flies.

319 Longwood Avenue

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DERMATITIS EXFOLIATIVA FOLLOWING ARSPHENAMINE THERAPY*

Observations on Fifty Cases

MAURICE J. COSTELLO, M.D.,† AND SIMEON LANDY, M.D.‡

NEW YORK CITY

DURING the course of each year, a number of patients suffering from dermatitis exfoliativa caused by the arsphenamines are treated in the dermatologic wards of Bellevue Hospital. Most of these patients have been treated for syphilis by private physicians, hospital clinics or public-health services in New York City. The 50 cases reported herein were observed at Bellevue Hospital between the years 1937 and 1942, showing that the dreaded postarsphenamine dermatitis is not rare even in the present period of antisyphilitic therapy. These patients were studied in the dermatologic wards from their admission until they were well enough to leave the hospital. Three of the patients had received their antisyphilitic treatment in this hospital.

The histories of these cases furnish convincing evidence that this complication of treatment could have been avoided in a number of cases, and that in the 2 fatal cases death might have been prevented if it had been possible to obtain a proper history and if the warning signs had been recognized.

The ages of the patients ranged between eighteen and sixty-nine years. There were 3 in the second decade, 9 in the third, 12 in the fourth, 16 in the fifth, 8 in the sixth and 2 in the seventh. The average age was 38.5 years.

There were 26 women and 24 men. Twenty-six were Negroes, 22 were Whites, and 2 were Japanese. Nineteen occupations were represented. Housewives, restaurant workers and unemployed constituted over 60 per cent of the total number. The average hospital stay was forty-three days, the shortest four days and the longest one hundred and seventy-one days. The average duration of the arsenical dermatitis was sixty-nine days, the shortest ten days and the longest two hundred and forty days. Forty-eight patients were improved or cured, and 2 died.

When admitted to the hospital for treatment of the arsenical dermatitis, 1 patient was in the primary stage of syphilis, 34 were in the secondary stage, 3 had early latent syphilis, and 11 had late latent syphilis. None of the patients had manifestations of tertiary syphilis. One patient had a papulonecrotic tuberculide.

Forty-two patients had received neoarsphenamine, 2 had received Mapharsen, 2 had received Mapharsen followed by neoarsphenamine because they developed a mild dermatitis from the former, and 2 had received acetylglucoarsphena-

*From the Department of Dermatology and Syphilology, New York University College of Medicine, and the Department of Dermatology and Syphilology, Third Medical (New York University) Division, Bellevue Hospital (service of Frank C. Coombes, M.D.).

†Assistant clinical professor of dermatology and syphilology, New York University College of Medicine; assistant attending dermatologist and syphilologist, Third Medical (New York University) Division, Bellevue Hospital.

‡Senior resident, Third Medical (New York University) Division, Bellevue Hospital.

mine. The type of arsenical administered to the remaining 2 patients was unknown.

The smallest number of injections administered prior to the development of dermatitis exfoliativa from neoarsphenamine was three and the largest sixteen, with an average of eight. The majority of the patients complained of pruritus or dermatitis soon after the fifth, sixth or seventh injection. In many cases either these warning signs were not observed or the patient was not questioned concerning them. Ignorance of the significance of mild itching and mild dermatitis in the course of arsenical therapy led to full-blown dermatitis exfoliativa.

One of the patients had pruritus after the third injection. This increased until it was accompanied by dermatitis after the seventh injection, and death followed soon after the tenth injection. Another patient, who developed a severe dermatitis exfoliativa after the first injection of neoarsphenamine, later gave a history of having had a similar eruption eleven years before that had required hospitalization for two months; the eruption followed the third injection of an arsenical preparation. It began as generalized urticaria and angioneurotic edema of the face and lips and was characteristic of the dermatitis that occurred in those who had previously been sensitized. This severe complication of arsenical therapy can usually be anticipated, but several of the histories show that in patients sensitized by previous injections of an arsenical preparation the eruption appeared after the first injection of the arsphenamine.

Another patient received one injection of neoarsphenamine and developed a severe dermatitis exfoliativa with numerous vesiculobullous lesions. She had received about seventy-five injections of neoarsphenamine in 1935 and 1936, which was three years prior to the eruption on admission.

A patient stated that he had received a course of neoarsphenamine followed by a course of mercury sixteen years previously, without untoward effect. After the second injection of neoarsphenamine in the series of treatment before entry, a mild dermatitis appeared. He did not report this until he had received six injections of neoarsphenamine, when a generalized pruritic exfoliating dermatitis was present.

Another patient tolerated well his first course of an arsphenamine and two courses of bismuth salicylate, but developed a moderately severe dermatitis following the first injection of the second course of neoarsphenamine.

One injection of neoarsphenamine was administered to a patient in 1920, and he received no further treatment until 1941, when he developed an eruption of a mild nature following the fifth injection of Mapharsen and a dermatitis of severe character after subsequently receiving two doses of neoarsphenamine — 0.2 and 0.4 gm., respectively — at weekly intervals.

Robinson and Moore[1] have induced a second attack of dermatitis with a very small dose of arsphenamine — 0.1 cc. of a 1:2000 solution — injected intradermally six years after the first eruption.

One patient developed an eruption after having received twelve injections of Mapharsen. The dermatitis was mild, and intravenous injections of neoarsphenamine were substituted for Mapharsen. After the fifth injection of the latter drug, the patient developed generalized pruritus, and after the sixth injection a lichen planuslike eruption on the wrists and ankles. Later the eruption became generalized, exudative and fissured and was accompanied by edema of the face and severe itching. It is probable that Mapharsen sensitizes such patients to the neoarsphenamine subsequently administered.

Mapharsen was the cause of an arsenical eruption in 2 patients, to whom it was the only arsphenamine administered. In one of them, the dermatitis appeared after the twenty-first injection; in the other, it appeared after the sixteenth injection. Mapharsen seldom causes an arsenical dermatitis. When it does, the eruption usually appears late, unless the patient has been previously sensitized.

Acetylglucoarsphenamine, administered by intramuscular injection, was given to a selected group of patients in the dermatologic wards of Bellevue Hospital. One patient after the sixth injection of this drug developed pruritus and a mild dermatitis, which became aggravated and more extensive after the seventh injection. Another received ten injections of acetylglucoarsphenamine before the eruption appeared.

Intramuscular injections of bismuth salicylate and intravenous injections of an arsphenamine were administered in alternating courses to 12 patients. In 10 cases these drugs were given concurrently, that is, the heavy metal was administered in the same week as the intravenous injection of the arsenical drug. Twenty-eight patients received only the arsenical drug without the heavy metal. It appeared to make little difference whether the arsphenamine was administered with a heavy metal in alternating courses, concurrently or alone. When it was administered in alternating courses with a heavy metal the eruption appeared, on the average, following the ninth injection; when it was given concurrently, after the eighth injection; and when administered alone, after the sixth injection. This leads one to believe that the extra load of heavy metal therapy is not a factor in the production of arsphenamine dermatitis exfoliativa.

All the patients who developed an eruption following the first or second dose of an arsenical preparation gave a history of having previously received an arsphenamine. Moore,[2] and Stokes,[3] whom he quotes, state that they have seen patients who developed exfoliative dermatitis after the first dose of an arsenical preparation.

Twenty-five of the patients had a temperature of over 100°F. The highest temperature was 101°F. in 9 cases, 102°F. in 4, 103°F. in 8 and 104°F. in 3. One patient had a temperature of 105.6°F. Even moderate fever was accompanied by malaise and prostration.

Clinical jaundice occurred in 2 patients. In a patient with latent syphilis, it preceded the eruption by three days. The patient had received four injections of neoarsphenamine. The icteric index was 9, the van den Bergh direct reaction was delayed, and the indirect reaction was slightly positive. The other patient had been treated several years before. The icteric index was 9, the van den Bergh direct reaction was delayed, and the indirect reaction was positive.

Urinalyses did not show abnormal findings in the majority of the patients. Albumin, casts and white or red cells were occasionally found. A + test for sugar was noted in 1 patient. The urines of 10 patients were examined for arsenic. In 6 patients, the amounts per liter varied from 0.004 to 1.540 mg.; in 2, arsenic was said to be present; in 1, there were varying amounts; and in 1, a ++++ test for arsenic was reported.

Twenty-seven patients had a positive blood Wassermann reaction and 23 a negative reaction.

In the great majority of the cases studied, the eruption was generalized or universal. The regions of the body affected, in the order of frequency, were as follows: extremities, torso, axillas, groins, neck, face, chest, back, eyelids, hands, feet, ears, wrists, ankles, scalp, lips, oral mucous membrane and conjunctivas. Generalized adenopathy was present in most of the cases.

It is well known that the arsenical drugs are capable of causing many types of toxic cutaneous manifestations; of these, dermatitis exfoliativa is the most serious. Pruritus, burning and pain in varying degrees were common to all the eruptions. Erythema, scaling and severe exfoliation occurred in nearly all the patients. Edema, especially of the lower extremities, due to stasis, and angioneurotic edema of the eyelids, face, lips and mucous membranes were constant features of the early manifestations of the dermatitis. Denudation of the mucous membranes of the mouth and respiratory tract, causing severe bronchitis, was frequently encountered.

Peeling of the palms and soles, accompanied by pruritus and fever, were occasional forerunners of the severe generalized eruption. In many cases, if these signs had been heeded, the generalized dermatitis might have been prevented or its gravity lessened.

The eruption began with the appearance of flexural erythema and pruritus, followed by large-coin-sized, dusky red, slightly elevated lesions on the torso, especially the back. These lesions often resembled those of erythema multiforme and by coalescence became plaquelike, hyperpigmented, lichenified and scaly. In the patients who developed this type of dermatitis for the first time, the lesions were macular and later maculopapular, in contradistinction to the vesiculobullous lesions occurring in the explosive types, especially in those who were sensitized by previous medication.

Concomitant symptoms of dermatitis exfoliativa varied with different patients. They included malaise, jaundice, hiccoughs, epileptiform convulsions, nervousness, toxemia and cough.

The indications of lowering of resistance to cutaneous bacterial infections in dermatitis exfoliativa due to arsenic are the frequent occurrence of furuncles of the axillas, purulent conjunctivitis, blepharitis, and deep-seated abscesses that have followed the intramuscular injection of crude liver extract. Bronchopneumonia as a result of similar bacterial invasion of the bronchial mucous membranes was the cause of 1 death. Stokes and Cathcart[4] believe that dormant foci of infection should not be disturbed in patients suffering from arsphenamine dermatitis, because of the danger of septicemia.

Of the mechanisms involved in the causation of the arsenical dermatitis, we agree with Moore[2] that in severe eruptions the sensitization phenomenon is more important than either the angioneurotic reaction syndrome or the associated infection.

Complete blood-cell counts were performed on many of the patients, and in most cases they were within normal limits. In a few cases the red-cell count was as low as 2,500,000, and in several it averaged about 3,500,000. A number of patients had a low hemoglobin; in several cases it was between 50 and 60 per cent. One patient had thrombocytopenia, the blood platelet count being 60,000. Leukocytosis was more frequently encountered than leukopenia and ranged from 18,000 to 27,000. Eosinophilia was frequent, the percentage ranging from 10 to 56, but severe injury to the bone marrow resulting in agranulocytic angina and purpura was not observed.

Sodium thiosulfate was administered intravenously to 30 patients. The smallest number of injections was three, the highest ten and the average four. These patients also received 1 gm. of sodium thiosulfate by mouth three times a day for ten days. This drug was of no value, which agrees with the clinical experience of Moore[2] and the experiments of Muïr,[5] who investigated the effect of sodium thiosulfate in the treatment of arsenical poisoning in rabbits. One gram of calcium gluconate was administered intravenously to 10 patients every other day for six doses. It was of questionable value.

Intravenous glucose solution was administered to 10 patients in daily amounts varying from 20 to 50 cc. of a 50 per cent solution to 1000 cc. of a 5 per cent solution, being continued for ten days. Glucose administered in this manner appears to be

of benefit in detoxifying the patient. Mu[6] thinks that there is an association between liver damage and glucose metabolism. It was necessary to give blood transfusions to 3 patients because of severe secondary anemia.

Concentrated vitamin preparations, including ascorbic acid, 100 mg. three times a day, were administered. It was impossible to determine their value because they were not administered alone. Seven patients received intramuscular injections of crude liver extract. In several cases this form of therapy had to be abandoned because the patient developed deep abscesses that had to be widely incised and drained. Hence, patients suffering from exfoliative dermatitis should not be given crude liver extract intramuscularly because of the likelihood of abscess formation at the contaminated sites of injection.

It was necessary to administer sedatives to many of the patients because of the nervousness and loss of sleep occasioned by intolerable itching and burning. Patients were encouraged to drink copiously of fluids, especially fruit drinks.

Local treatment in general consisted of the following: potassium permanganate, starch and colloid baths; body inunctions with boric acid ointment; and wet compresses of a 1:10 Burow's solution. Other forms of local therapy were applied, depending on the indications that arose. Dalibour's solution (1:10) was applied as wet dressings and was also used in the bath. Wet boric acid compresses and wet dressings of silver nitrate solution (1:1000) were of value in treating areas of secondary infection. Aquaphor and lime-water ointment proved to be a good emollient. Ten per cent oil of cade in aquaphor relieved the pruritus in the dry stage of the eruption. Forty per cent sulfur ointment was of little value. A 1 per cent alcoholic solution of brilliant green proved efficacious on moist, oozing areas, such as the axillas and inguinocrural regions. Crude coal-tar paste was of value in the patchy dry areas that remained when the universal eruption was undergoing involution.

The application of Unna boots was helpful in patients who had uncontrollable itching and severe edema of the lower extremities. The application of subfractional doses of superficial roentgen rays had no appreciable effect on the pruritus or the dermatitis.

The following recommendations are based on the clinical findings in this series:

The patient should be asked at each visit whether he has itching, a rash, fever or headache.

When arsphenamine, neoarsphenamine or silver arsphenamine has been used, it is advisable to have the patient remove his clothes for a complete examination of the skin before the sixth, seventh and eighth injections. A similar examination should be performed before the twelfth to the fifteenth injection of Mapharsen.

If a patient develops an eruption that is not readily recognized as one caused by the arsphenamines, it is safer to withhold treatment until a dermatologist decides the question.

The patient should always be asked, regardless of the stage of the syphilitic infection, whether he has previously received intravenous or intramuscular injections. Information on this point may modify treatment and thus prevent the explosive reaction following the first dose of an arsphenamine drug in a sensitized person.

Further treatment with an arsenical preparation should never be given if the original dermatitis was vesiculobullous or exfoliative. Disregard of this warning may be fatal. Subsequent treatment with an arsphenamine is also dangerous if it produces a macular, maculopapular or lichenoid exfoliating eruption with pruritus. If treatment with an arsenical drug is imperative in this group, all vestiges of the dermatitis must have disappeared before an arsenical drug in small doses is again cautiously administered. Reappearance of the dermatitis following this procedure should forever contraindicate the administration of the arsphenamines.

It is advisable to examine the urine daily during the course of dermatitis exfoliativa and to conduct a complete examination of the blood frequently in the acute phase, because blood dyscrasias are at times associated with the former complication.

Summary and Conclusions

The observation and treatment of 50 patients with dermatitis exfoliativa caused by the arsphenamine drugs are discussed. Recommendations regarding therapy that are based on these observations are given.

Age, sex and race apparently played no part in the causation of arsenical dermatitis.

Freedom from reaction to arsphenamines at a previous time does not guarantee the same good fortune with future arsenical treatments.

Major arsenical dermatitides are extremely resistant to all forms of general and local treatment, including the application of superficial roentgen rays.

The major arsphenamine dermatitides have certain features in common: they are pruritic; they are generalized or universal; they are exfoliative, with constitutional symptoms and evidence of injury to the viscera, especially the liver; and they are made worse by the continuation of arsenical therapy.

140 East 54th Street

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MEDICAL PROGRESS

INSECT VECTORS OF DISEASE (Concluded)

VLADO A. GETTING, M.D., DR.P.H.*

BOSTON

CONTROL OF INSECT-BORNE DISEASES

Space does not permit complete discussion of the control of various types of insect-borne diseases. There are, however, certain factors that apply to most of these diseases.

In the normal course of an epidemiologic investigation, collections are made of the insects suspected of transmitting the disease in question. The best method for collecting insects is to take advantage of their feeding habits. Adult mosquitoes may be collected either while biting man or while resting on walls and ceilings.[51] A large glass test tube, containing rubber bands saturated with carbon tetrachloride or chloroform at the bottom is placed over the specimen until the mosquito is anesthetized. Then it is slowly removed and the tube corked with the specimen inside the tube. After an interval of a few minutes the specimen is carefully placed between layers of cotton batting in a suitable container, such as a pillbox, and properly labeled. The following data should always be noted at the time the specimen is captured: place of capture — state, town, street and number of house or location of barn, description of surroundings and so forth; date, time of day, climatologic conditions and so forth; remarks regarding conditions when caught, such as biting man or horse, where resting and so forth; and name and address of collector. When mosquito larvae are collected, similar data should be noted,[134] particularly the type of body of water from which the collection was made, such as salt marsh, hoofprint, roof gutter, rain barrel or running brook. Larvae are collected in white dippers with a capacity of a pint or a quart; from these they are removed by glass pipettes furnished with a suction bulb and are put into test tubes containing 70 to 80 per cent ethyl alcohol or 10 per cent formalin. Each tube should be properly identified, preferably by placing a slip inside the tube.

Bugs and ticks should be removed by forceps, as crushing the arthropod between the fingers may result in infection of the collector. Specimens should be immersed in 70 per cent ethyl alcohol containing 1 per cent formalin. Large specimens, after killing with chloroform or carbon tetrachloride, may be transfixed by pins and mounted in a box. Sucking lice are found only on their host. Mites are most easily collected from animals. Fleas may be collected both from animals and their nests. Specimens can be preserved in 70 per cent ethyl alcohol.

Two groups of arthropod-borne diseases, namely, those that are transmitted by mosquitoes, chiefly malaria, and the typhus fevers, which are transmitted by lice, mites and fleas, will be used to illustrate the methods of attack against these diseases.

Mosquito-Borne Diseases

The malignancy with which malaria can attack an area is illustrated by the spread of the disease in Brazil after the introduction of *Anopheles gambiae* from Africa by either ship or airplane.[46] In 1937 and 1938 it caused an epidemic in one section that affected some 60,000 out of a total population of 70,000 and caused over 5000 deaths. Vast sums of money were expended by the Brazilian government and the Rockefeller Foundation in an attempt to exterminate *A. gambiae*,[135] which threatened not only to pauperize Brazil but to extend throughout South America and perhaps even farther. Until quite recently it was believed that this vector had been eliminated from Brazil, but it has again been found, probably being a reimportation.[136]

Briefly, the control of any mosquito-borne disease must be based on one or more of the following procedures: control of the mosquito vector; protection of man and animals from the bites of infected mosquitoes; immunization of susceptibles; removal of sources of infection of mosquito vectors by isolation of cases and by treatment of carriers; and, finally, prevention of entry of the mosquito vector and possible sources of infection into areas unaffected by the disease. All these methods are not applicable to every mosquito-borne disease.

Mosquito control. Certain conditions are necessary before a mosquito-borne disease can become

*Commissioner, Massachusetts Department of Public Health and lecturer in public-health practice, Harvard School of Public Health.

epidemic or reach a high endemic index. One of these is the existence of a certain numerical relation between hosts, vectors and susceptibles. When this numerical relation is upset by a reduction of the number of vectors, the disease ceases to be epidemic and rapidly declines, either arithmetically or geometrically, depending on the interrelation of many related factors. It becomes apparent that a moderate reduction in the number of mosquitoes below the critical level will markedly reduce the prevalence of the disease in an area where there are many persons who are immune, but in a region with many who are susceptible, the reduction below the critical level must be much greater. This concept was developed many years ago by Ross, who applied it to malaria; Carter and Gorgas applied it to yellow fever.

The bionomics of mosquitoes are such that control measures must be designed to eliminate or control the larvae or the adults. The measures that are most effective in any area depend on local factors and on the genus and species of the mosquitoes concerned. It is impractical and uneconomical to attempt to control all mosquitoes. The control measures must be directed against that species which it is desired to reduce below the critical level. Therefore, in order to ensure effective control measures, it is important to understand the bionomics, breeding habits and seasonal and geographical distribution of the species that are concerned with the transmission of the disease. Since local circumstances vary, it is necessary that a mosquito survey[51, 137] be made before control measures are introduced into any area for the purpose of controlling mosquito-borne disease. Even in controlling mosquitoes as a nuisance, it is necessary to determine their bionomics before an economical and efficient nuisance control can be expected.

Mosquito control has been effective in malaria and yellow fever. There has been considerable less experience in the effectiveness of this method in dengue fever, but since the principal vector of this disease is the same as that of yellow fever, there is every reason to believe that mosquito control will prove just as effective. In filariasis this method has also proved to be effective where it can be applied. To date, there has been no notable effort to control the vectors of equine encephalomyelitis. Theoretically, this method should be effective; but the natural vector of this disease has not yet been determined, and additional epidemiologic and entomologic investigations are needed before this method can be applied.

Mosquito control measures are of two types — temporary and permanent[138]; to these may be added natural control, such as surface-feeding fish. Temporary measures consist of the application of larvicides, such as oils, Paris green, other dusts and, finally, D. D. T. (dichloro-diphenyl-trichloroethane). Larvicides are used whenever permanent control is either not possible or not economical. The best larvicidal oil kills in less than thirty minutes and consists of No. 2 fuel oil. It kills by suffocating the larvae by blocking the respiratory tubes, the toxic action of the volatile oils and vapors, the toxic action of the water-soluble fraction and the change in surface tension whereby the larvae cannot remain attached to the water surface. The oil is applied by sprays, at a rate of about 15 gallons per acre at intervals of seven to ten days. Paris green is usually diluted with other dusts so that the final mixture contains 2.5 to 5 per cent Paris green by volume; it is applied by a rotary blower using ½ to 1 pound of Paris green per acre at weekly intervals. It is especially active against anophelines, being an intestinal poison that floats on the surface and is easily available to the top-feeding larvae.

Permanent control measures may include drainage, channeling of streams and marshes, filling, shore-line cleaning and removal of vegetation, periodic water-level fluctuation, flooding, flushing and automatic syphoning, changing water salinity, shading or exposing to sunlight and introducing natural enemies. Their application depends on the terrain, the species to be controlled and the cost and effectiveness of the types of control measures available. Only an expert malariologist should attempt to decide on proper permanent control measures.

Protection from mosquitoes. Effective protection from the bites of mosquitoes can be accomplished only under extremely limited conditions. Screening, the use of nets and the avoidance of unnecessary exposure are the most effective methods. Spraying in houses, the application of mosquito repellents[139] and the killing of individual adults are adjuvants. For this method to be really effective, animals and man would have to remain behind screens at all times. Since this is a physical impossibility, protection against mosquito bites is only partial. It is about equally applicable in all mosquito diseases, the differences being dependent on the habits of the adults of the species concerned.

Military units moving into areas where mosquito-borne disease is prevalent can avoid unnecessary exposure by locating camp sites at distances from breeding places and native habitations that are greater than the flight range of the vector, due regard being taken of the direction of prevailing winds.[140, 141]

Numerous substances have been used as repellents; they are at best transitory, and some are toxic if used liberally. At present there are three fairly good repellents — "612," Indalone and dimethyl phthalate.[142] The first gives protection for about four hours, even when persons are sweating. Indalone lasts equally long except under sweating conditions, when it should be reapplied every half

hour. Dimethyl phthalate is intermediate in lasting qualities. Repellents must be applied to all exposed surfaces except the mucous membranes.

Certain species of Anopheles prefer animal blood to that of man. In areas where such mosquitoes are vectors, they may be diverted by the importation of animals. This zoöphilic attraction to cattle has been used in the Balkans.

Immunization of susceptibles. Specific immunization has proved effective in yellow fever.[143] It is, however, not yet available to the public in all endemic areas. Although the vaccine is a live attenuated virus, no case of typical yellow fever has resulted from over two million vaccinations performed in Brazil.[144] Furthermore, it has been demonstrated that mosquitoes that bit vaccinated persons did not infect monkeys on subsequent biting. Unfortunately, immunity is temporary and annual revaccination is required.

In equine encephalomyelitis, a vaccine composed of formalized virus obtained after growth in chick embryos has proved effective in the protection of horses.[42] Except for laboratory workers, this vaccine has not been used in man, owing to the severe reactions that have been encountered. Moreover, the risk of exposure to the disease has been so small that community immunization has not been indicated. Vaccination of horses must be repeated annually, since the immunity is temporary. The decrease in the incidence of this disease since 1939 has been attributed in part to the vaccination of horses.

There is no specific immunization against the other mosquito-borne diseases. The suppressive use of quinine[145] and Atabrine[146] in malaria is an attempt to destroy the plasmodium as soon as it is introduced into the blood stream. Neither drug,[147] however, is effective in preventing the disease. The activity of the plasmodium is reduced while suppressive doses of the drug are being administered, but about two weeks after such doses are stopped, symptoms of clinical malaria are likely to make their appearance. There is some evidence that the prolonged use of suppressive doses of both quinine and Atabrine, which are about equally effective, tends to lessen the seriousness of malaria in subsequent attacks. Plasmoquin is of no value as a suppressive drug in malaria.

There is no general cross immunity in malaria, nor are there any between types or even different strains of the same type. This was well illustrated by failure of the British attempt to forestall malaria in Malaysia by using Indian troops who had previously had malaria.[148]

Removel of sources of infection. This is effective only to a limited extent. Cases of the disease, with the infecting agent in the circulatory blood, may act as foci of infection for vectors. Theoretically, it is therefore good preventive medicine to isolate these patients in mosquito-proof quarters. Except for malaria and filariasis, which are, respectively, due to a protozoan and a helminth, the mosquito-borne diseases are caused by a virus that remains in the blood stream for a relatively short time,[149] frequently disappearing soon after the disease manifests itself.[150]

Malarial gametocyte carriers are the foci of outbreaks of the disease in new areas.[151] Since filariasis is often symptomless,[152] and since the worms may remain in the blood for prolonged periods, persons with mild forms of the disease and carriers may act as sources of vector infection. Malarial carriers may be eliminated by adequate treatment, but filarial carriers remain permanent, since there is no known effective drug therapy in this disease.

Prevention of entry into new areas. This method is applicable to all arthropod-borne diseases. The principles of isolation and quarantine[153] are utilized in every community. In the case of certain diseases, especially those with a wide host selectivity, the prevention of the spread of a disease is difficult. This feature is well illustrated by yellow fever. This disease was apparently controlled in Brazil by the use of the usual mosquito-control methods and isolation and quarantine on a community basis.[154, 155] Suddenly, however, it became apparent that jungle yellow fever was due to the persistence of the disease in other hosts and vectors.[156] Equine encephalomyelitis has an even wider host selectivity. Its spread may be due to vectors or hosts. Since the hosts include animals and birds, the geographical limitation of this disease becomes a difficult problem. Malaria and filariasis are usually spread by hosts who are not known to be infected, and in these days of rapid transportation it is practically impossible to eliminate the travel of such persons.[157] Moreover, several instances are recorded in which disease vectors and other insects have been transported to areas where they had never been found.[158, 159]

When control methods are dependent on control of man, only limited success may be expected, as some individuals are unco-operative. The most effective method in the control of mosquito-borne diseases has been a direct attack on the mosquito,[10] which results in a reduction of vectors to a point below the critical level required to maintain the disease.

Typhus Fevers

The typhus fevers comprise a group of disease entities each with its peculiar epidemiologic setting.[128]

Classic European or epidemic typhus fever is louse transmitted,[160] and all measures that are employed to delouse achieve a measure of control of the disease. The older methods of delousing bodies and clothing[20] are familiar to all veterans of World

War I, since lousiness was characteristic of all troops. The present war, however, has brought about miraculous developments in delousing technics,[161] resulting in virtual elimination of epidemic typhus from the Army and its control among civilians in combat areas. Methyl bromide fumigant in cartridges is available for disinfecting clothing in barrack bags. More phenomenal in its success against the head and body lice (*Pediculus humanus capitis* and *P. humanus corporis*) has been the application of D. D. T. powder to both the body and clothing. These drugs are also effective against fleas but have no effect against mites.

Endemic or murine typhus is spread by fleas. About 90 per cent of the 4000 cases reported annually in the United States occur in Alabama, Texas and Georgia.[162] In 1926, Maxcy[163] made important epidemiologic studies, which eliminated the possibility of louse transmission of typhus fever in southern United States. In 1931, Dyer and his associates[164] obtained murine typhus from the brains of rats captured in a prison in Mexico City. It has since been demonstrated that the infection is passed from rat to rat by both rat fleas (*Xenopsylla cheopis*) and rat lice (*Polyplax spinulosa*).

Scrub typhus or tsutsugamushi fever is transmitted by several species of Trombicula mites and does not occur in the United States.[165, 166] It is prevalent in the South Pacific and Asia. Clothing impregnated with dimethyl phthalate is efficient in killing the mite vectors.[167] The burning over of areas used to bivouac troops is effective in ridding the area not only of fleas and mites but also rodents and other vermin that may act as vectors of disease.

These three types of typhus fever are immunologically distinct[168] and can be identified in the laboratory by Weil–Felix reaction and by complement-fixation tests.[169] Vaccines have been prepared by various methods,[170] employing chick embryos, lice and so forth, and have proved effective against the epidemic and endemic forms of the disease. The same vaccine, however, is not effective against scrub typhus.

Rodent control is, of course, of importance in the control of endemic typhus fever,[171] but the control of rodents in other rickettsial diseases is only of value under limited circumstances. Nevertheless, wild rodents, from field mice to rabbits, may be hosts of the exoparasites that are infected with various types of rickettsia.[172]

Dichloro-Diphenyl-Trichloroethane

D. D. T. was first synthesized by a German chemist in 1874,[173] but it was not used as an insecticide until 1939, when a Swiss firm sold it as a control for moths and plant lice. Since November, 1942, the United States Department of Agriculture has experimented with D. D. T., not only as a control for agriculture insect pests but as a control for arthropod vectors.

D. D. T. is a tasteless, fine, white powder, insoluble in water. It tends to form lumps, is not affected by exposure to the air and sunlight and does not vaporize. The residue on a sprayed surface retains its toxicity as a contact poison to insects for several weeks.[61] It is easily dispersed in dust and forms an emulsion with oils.

A powerful poison to the insect nervous system, it is absorbed through the chemotactic sensory organs in the tips of tarsi. Soon after exposure, the insect drags its legs, loses co-ordination, develops tremors and dies in convulsions. It is not a repellent and does not kill instantaneously like pyrethrum; death usually takes from several minutes to several hours.

Although the dry powder is not absorbed through the skin, concentrated oily emulsions are absorbed and may prove toxic in large doses, causing hyperexcitability, tremors, chronic convulsions and liver damage.[174] Precautions must therefore be taken to avoid repeated and prolonged contact with oil emulsions. Inhalations of heavy concentrations of D. D. T. smokes have not proved toxic to either animals or man. When ingested, however, D. D. T. is toxic for both animals and man, 200 mg. per kilogram of body weight per day killing 90 per cent of the test animals. When applied to water in the amounts recommended for larvicidal purposes, it is not toxic to fish, animals or man. Cyclohexanone is frequently used as a solvent for D. D. T.; although it is less than one tenth as toxic as D. D. T., in heavy concentrations it causes a temporary, harmless irritation of the eyes, nose and lungs.

D. D. T. may be mixed with 9 parts of inert powder for use as an insecticide or with the same amount of talc or pyrophyllite for use against body lice. An emulsion containing 25 per cent D. D. T., 68 per cent xylene and 7 per cent Tritonx-100 may be diluted with 4 parts of water, making a 5 per cent emulsion: or the pure powder may be mixed with No. 2 fuel oil, No. 10 lubricating oil, kerosene or other oils to form a 5 per cent emulsion. Aerosol bombs containing 0.3 per cent pyrethrines and 3 per cent D. D. T. have been demonstrated to be effective as an all-purpose insecticide. Such bombs should prove of value in disinsectisizing planes. Special nozzles for spraying or dusting equipment are required, depending on the use to which the drug is being put. A fog is most effective against adult insects; for larvicidal purposes a fine spray is best; and for a residual effect on solid surfaces a coarse or semi-fine spray is needed to moisten the surface. A residual of 0.1 to 0.2 gm. of D. D. T. per square foot is desired; thus 1 liter of a 5 per cent solution is adequate for 250 to 500 square feet. The drug continues to be effective for weeks or months, depending on climatologic conditions. The drug may be sprayed both indoors and out. Although D. D. T. tends to stick to surfaces, heavy rains wash off a considerable amount, which may be detectable in the runoff.

Mosquitoes. D. D. T. as a 5 per cent emulsion in kerosene, light oil or water, when used as a mist or fog, is effective at a rate of 1 liter per acre against 90 to 99 per cent of the adult mosquitoes within an hour. If sufficiently large areas are treated, the centers of these can be kept free of mosquitoes for several days. Aerosol bombs containing about 500 gm. of aerosol (5 per cent D. D. T.) are about equally effective against adult mosquitoes for periods of several hours. Spraying the inside of a building will cause death of mosquitoes for days to come.

Both Culicinae and Anopheles larvae are susceptible to D. D. T.[175] A 5 per cent emulsion in No. 2 fuel oil in amounts of 1 or 2 liters per acre of water surface is usually adequate for six to nine days. Prolonged effectiveness, up to three or four weeks, may be obtained with doses of 5 to 10 liters per acre. The oil should be applied as a fine spray and not as a drip or poured on the water. Concentrations of 1 part in 10,000,000 are lethal to fish. If dust is used, about 200 gm. of finely powdered D. D. T. should be mixed with 5 to 10 parts of fine road dust or other diluent and dusted over 1 acre.

Flies. Oil or water emulsion sprays are fatal to flies in about thirty to forty-five minutes. The drug is also effective as a powder or dust; residual action is particularly important, rendering a building free of flies for about a month.

Bedbugs. Spraying about 250 cc. of a 5 per cent emulsion of D. D. T. in kerosene on a bed will keep it free of bedbugs for perhaps as long as four to six months.

Lice. A powder containing 10 per cent D. D. T. mixed with talc or pyrophyllite, when applied to the entire inner surface of clothing worn next to the skin, particular attention being paid to the seams, and on the skin, is efficient in keeping persons louse-free if repeated at monthly intervals or after each change of clothing.[176–178] Areas about the neck, armpits, waist and crotch should receive special attention. About 30 to 60 gm. should be used for each treatment. Since the dry powder is not absorbed, it is harmless; it should not be used on animals, since they may ingest toxic doses by licking themselves.

Clothing may be impregnated with a 10 per cent emulsion of D. D. T.; this is effective in killing lice even after six to eight weekly washings with soap and water. The amount of emulsion required is about 2 per cent of the weight of the clothing.

Pubic lice may be killed by applying 10 per cent D. D. T. to the hairy portions of the body and repeating after eight to fourteen days; the drug does not kill the eggs.

Fleas. Both the powder and the emulsion are effective in killing fleas. The residual effect of emulsion is effective.

Roaches. These pests, except for the German roach, which is light brown and about 0.5 cm. long and occurs in the southern United States, are as easily controlled as are flies and fleas. The powder should be applied in the same way as other roach powders.

Miscellaneous. D. D. T. is not effective against mites, spiders, ticks and centipedes. It must be used with caution, since it is toxic to many beneficial insects, such as bees.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

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BENJAMIN CASTLEMAN, M.D., *Acting Editor*

EDITH E. PARRIS, *Assistant Editor*

CASE 31131

PRESENTATION OF CASE

A sixty-four-year-old man was admitted to the hospital because of hemoptysis and abdominal pain.

He had been in good health until approximately a year before admission, when he first noted a dull, aching, nonradiating, intermittent pain under the lowest rib in the right midaxillary line. Six weeks before entry he became aware of a gradual weight loss, amounting to about 16 pounds in the previous six months. He also began to notice mild anorexia and malaise. Urgency, frequency and dribbling, which had been present for two years, became more intense. Three weeks before admission and five to six hours after ingesting a heavy meal, he was suddenly awakened at night by a severe, constant, periumbilical pain, which radiated to the perineum and to the tip of the xiphoid. So intense was this pain that he vomited and spent the next five hours in agony. He worked the next day, although the pain was still present. It persisted throughout the following week and he was taken to a community hospital. He continued to be nauseated and the abdominal pain shifted from the periumbilical region to the right upper quadrant, where it localized. He remained afebrile. His stool habits and the gross appearance of the stools remained normal. Cystoscopy, a gastrointestinal series and a barium enema were reported as negative. A retrograde pyelogram was negative except for questionable blunting of the middle calyxes on the right. An intravenous pyelogram showed no visualization of the right kidney. X-ray studies of the chest were reported to show bilateral basal atelectasis and diminished excursion. During the four days before entry the pain in the right upper quadrant continued intermittently. He developed a cough, with small hemoptyses, and was transferred to this hospital.

Except for dysuria, nocturia (twice) and frequency the past history was noncontributory.

Physical examination revealed a well-developed, moderately well-nourished man in no acute discomfort. Examination of the heart was negative. The breath sounds were diminished at the right base posterolaterally and as far forward as the anterior axillary line. Over this same area there were fine rales and dullness to percussion. Localized pain with respiration and a friction rub were noted over the left lower chest posterolaterally. The abdomen and extremities were normal.

The temperature was 99.2°F., the pulse 100, and the respirations 20. The blood pressure was 120 systolic, 80 diastolic.

The urine was acid, with a specific gravity of 1.017, and gave a + test for albumin; the sediment contained numerous white cells and bacteria. Examination of the blood showed a white-cell count of 11,100, with 92 per cent neutrophils, and 10.5 gm. of hemoglobin. The serum nonprotein nitrogen, the protein and the chloride were normal.

X-ray studies of the chest revealed retarded motion of both leaves of the diaphragm, the right more than the left. Above them, linear areas of atelectasis were observed at each base, and on the right there were also patchy areas of increased density. It was thought that a small amount of fluid might be present in the right pleural sinus (Fig. 1). There was little change since the last x-ray taken in the other hospital, three days prior to admission.

During the patient's first night in the hospital the pain in the right posterior chest was severe and aggravated by cough. The pain was readily localized to an area under and to the right of the angle of the right scapula. Inspiration was limited, and the respiratory rate was 35. The rectal temperature was 101°F., and the pulse 110. The abdomen was distended, tympanitic and tense. There was questionable tenderness in the right upper quadrant. The calves were not tender, and there was no tenderness over the femoral veins. The patient raised a small amount of blood-streaked sputum. Repeated examinations and cultures of the sputum were nega-

*On leave of absence.

tive for tubercle bacilli, beta-hemolytic streptococcus and pneumococci.

On the second hospital day the chest was somewhat better aerated and the respiratory rate returned to 20. The gall bladder was faintly visualized in a Graham test.

On the fourth day a definite gallop rhythm was heard at the apex. Fresh blood was seen in the sputum. There was a definite but mild cellulitis of the left forearm. Measurements above and below the knees were symmetrical. The rectal temperature reached 103°F., and sulfadiazine was started. The pulse fluctuated between 100 and 120, and the respirations between 25 and 35. A thoracentesis in the ninth interspace on the right posteriorly yielded 60 cc. of grossly bloody fluid containing 6000 lymphocytes and monocytes per cubic millimeter. After the chest tap the respiratory rate was elevated to 60. Localized edema was noted over the painful area in the right chest posteriorly. There was tenderness in the costovertebral angle. A catheterized specimen of urine showed occasional red cells and 75 white cells per high-power field, and rare coarsely granular casts. A smear of the sediment showed a moderate number of gram-positive cocci in clusters, and a culture yielded abundant colonies of *Staphylococcus aureus*. Repeated serum nonprotein nitrogen and carbon dioxide determinations were normal. The sulfadiazine level did not exceed 6 mg. per 100 cc. The white-cell count and the differential were unchanged. The patient was given 50,000 units of penicillin and was placed in an oxygen tent. A surgical consultant thought that the abdomen and the subphrenic region were negative.

On the sixth day, the patient felt much better and the rectal temperature had fallen to 100°F. At 3 a.m. on the seventh day he became extremely restless, began to moan and appeared to be in marked distress. He promptly began to gasp and expired shortly thereafter.

FIGURE 1.

DIFFERENTIAL DIAGNOSIS

DR. DERA KINSEY: Out of this long and complicated story we have little definite knowledge. We do know, however, that this sixty-four-year-old patient had been chronically ailing for at least one year. His chief complaints were chest pain, weight loss, abdominal pain and urinary difficulties. The final illness came on suddenly; it may have been a part of the chronic illness or something new.

Had this man one disease process to explain all his symptoms or had he more than one? First let us consider the chest. He had had chest pain for one year and more acute pain recently. Pneumonia occasionally causes acute abdominal pain and sometimes is mistaken for an acute abdomen. The x-ray findings, the white-cell count and the temperature, however, are not in keeping with it. The x-ray examination also rules out tuberculosis. Furthermore, tuberculosis usually does not give a bloody pleural fluid. On the other hand, the bloody fluid, the weight loss and the age of the patient should make one consider metastatic malignancy. A likelier possibility is pulmonary infarction. The chest pain, the cough and the raising of blood-tinged sputum are classic symptoms. Infarctions are usually secondary to thrombophlebitis or thrombosis in the lower extremities. The emboli may originate, however, in any of the large veins or in the right side of the heart itself. The physician who took care of this patient evidently suspected pulmonary infarction because a careful search was made for the focus of the emboli but apparently none was found. Another suggestion of pulmonary infarction is the development of gallop rhythm. An electrocardiogram might have been helpful.

The patient's most acute symptom was abdominal pain, which began in the periumbilical region and radiated to the perineum and to the xiphoid. Frequent causes of periumbilical pain are small-bowel obstruction, — which may be caused by a malignant tumor, — kink, hernia and intussusception. All these things seem to be ruled out because the patient had normal stools, all the x-ray examinations were negative, and the vomiting ceased. The type of pain does not suggest disease of the gall bladder or acute pancreatitis. Cardiac decompensation with a large engorged liver can certainly cause severe abdominal pain of the type described here. We have no evidence, however, that the liver was large and engorged, and the only suggestion of congestive failure was the gallop rhythm. A subphrenic abscess with rupture into the pleural cavity may cause a combination of abdominal and chest pain. The character of the chest fluid and the absence of chills and of a high white-cell count are against this diagnosis. A dissecting aortic aneurysm can also produce abdominal and chest pain. The pain of a dissecting aneurysm, however, usually radiates to the back and down the legs.

May we see the x-ray films?

Dr. Milford D. Schulz: Here is a series of films of the chest. At the time of the original observation, the fluoroscopist saw nothing in the chest. In the film taken ten days later, however, the findings are as described — linear areas of increased density obscuring both leaves of the diaphragm and elevation of the leaves of the diaphragm. These changes persisted throughout the subsequent observations. This film, after retrograde filling of the right kidney, shows irregularity of the middle calyx. I wonder if it is not the filling that one sees in a retrograde pyelogram that has caused overdistention of the pelvis. All the calyxes are blunted. The kidney appears to be normal. I should think it was probably all right.

These are the films of the intravenous pyelogram; unfortunately they do not show much. Because of barium in the colon, the visualization is not too adequate, but you can see fairly distinct calyxes and no evidence of obstruction on either side.

Dr. Kinsey: Then you can see the right kidney?

Dr. Schulz: The kidney outline is obscured by overlying material.

Dr. Kinsey: You cannot see the calyxes?

Dr. Schulz: I believe that you can in this film. There is a faint shadow that probably represents the pelvis and some of the calyxes, but it is not good enough to warrant any statement.

Dr. Kinsey: An intravenous pyelogram showed no function of the right kidney but the retrograde pyelogram showed a practically normal kidney, with the exception of blunting of the middle calyxes. This indicates or suggests that something was interfering with the blood supply of that kidney. What might interfere with the blood supply? Thrombosis of the renal artery with infarction is a possibility and would have caused pain. It might even have been a thrombosis of the renal veins. A tumor such as a renal-cell carcinoma might explain many of the symptoms and signs, although the three most frequent findings — tumor, hematuria and pain referable to the kidney area — are absent. Renal-cell carcinoma or hypernephroma is very apt to extend up the renal vein into the inferior vena cava and to metastasize to the lungs, and in one case report of this condition from this hospital the outstanding symptoms were gastrointestinal.

Then I thought of one other possibility — subacute bacterial endocarditis of long duration, with mural thrombi giving out infected emboli and causing infarction in various parts of the body. This patient, however, had no evidence of rheumatic valvular lesions, which are usually present in subacute bacterial endocarditis. In fact, not many heart symptoms were noted. It seems that there was an additional terminal infection; those who took care of him probably thought that, because they gave sulfadiazine and penicillin.

In reading the abstract I made the following diagnoses and I shall stick to them even though they do not seem quite so obvious after looking at the x-ray films: tumor of the right kidney, probably renal-cell tumor, with thrombophlebitis of the renal veins and with metastases to the lungs; and pulmonary infarcts, which may or may not be associated with the thrombophlebitis of the renal veins, because we do know that silent emboli may come from the extremities. We were told that he had a

cellulitis of the forearm, which might have been the focus. I believe that he also had an acute infectious process, such as a bacterial endocarditis or a bronchopneumonia.

DR. CHESTER M. JONES: This case was confusing because from the moment the patient entered the hospital the suggestion was made that he had a subphrenic abscess. That was as near as anyone had approached the diagnosis before he entered the hospital. The striking fact on admission was the clinical picture. He was extremely ill. He was badly distended and had been vomiting. He had a story that was difficult to obtain, but it pointed to an intra-abdominal disturbance, so far as we could find out. He remained extremely distended for several days, and then the distention disappeared after an enema and did not recur. I suppose the distention caused the elevation of the diaphragm.

He continued to complain of abdominal pain, but my feeling, in view of the x-ray studies that had been taken prior to admission, was that intestinal disease had been ruled out and that renal disease probably had been ruled out. I wondered whether or not he had an empyema of the gall bladder with perforation. He was tender in the right upper quadrant, but it was also apparent that he had abundant physical signs, including a friction rub, first in the left chest and later in the right. He had pain over the area of pulmonary signs; in other words, he had pain in the chest over the friction rub. I went over the previous chest films and the ones taken here and discussed them with several members of the x-ray staff. There was no final conclusion concerning what was going on above the diaphragm.

Chemotherapy was started because of a marked rise in temperature. At that time he had a striking cellulitis of the left arm that seemed to be associated with intravenous therapy, initiated because of severe dehydration. The following day he was seen by Dr. Sweet to determine if possible what was going on in the chest and to decide whether or not he had a subdiaphragmatic infectious process. By that time the fever had subsided, although the patient was still extremely sick. We went over his legs with the utmost care, because the question of pulmonary embolism had been raised, but we could not find any evidence of a thrombotic process. There was no tenderness, and he had a negative Homans's sign. The white-cell count was about 11,000, and at that time we tapped the right chest, inasmuch as the physical signs seemed more striking than the x-ray findings. We found bloody fluid. This was spun down and examined for malignant cells, without result. Furthermore, several specimens of sputum were examined for tubercle bacilli and the chest fluid was put into a guinea pig, also with negative results. Until the last episode we were definitely in doubt about what the patient had. I thought that he had intra-abdominal disease but did not know the nature of it. The final episode was, to my mind, pulmonary embolism, and I signed him out with that diagnosis.

CLINICAL DIAGNOSES

Pulmonary embolism.
Intra-abdominal infection of undetermined nature?

DR. KINSEY'S DIAGNOSES

Renal-cell tumor of right kidney, with thrombophlebitis of renal vein and metastases to lung.
Pulmonary infarcts.
Terminal infection: (?) bronchopneumonia or bacterial endocarditis.

ANATOMICAL DIAGNOSES

Pulmonary embolism, massive.
Pulmonary infarcts: multiple, bilateral, recent and healing.
Phlebothrombosis of leg veins.

PATHOLOGICAL DISCUSSION

DR. BENJAMIN CASTLEMAN: The autopsy showed that the terminal event was a massive pulmonary embolus and that most of the previous symptoms were probably due to smaller pulmonary emboli. At the edge and margin of the anterior surface and posteriorly along the diaphragm were numerous infarcts, which extended up to involve about the lower third of each lung. In several areas they were quite thin because they extended to the edge and had contracted down a bit. Some of them, especially one in the left lung, had a dimple on the pleura indicating that this was a healing infarct and could have been there for a matter of a month or two. Others were more recent. In other words, they varied in age from a couple of months down to a week or ten days. Some were red, and others were black and rather well circumscribed, with beginning encapsulation. The calf veins of both legs were the source of the emboli.

The kidneys were perhaps slightly larger in size than normal and showed evidence of pyelitis, which was apparently the source of the *Staphylococcus aureus*. We were unable to find any infection in the parenchyma of the kidney itself. One microscopic section showed a thrombus in a small vein, and a small focus of tissue nearby was infarcted. There were no large thrombi or emboli. I am sure that this was not the cause of the severe abdominal pain; if so, there would certainly have been a larger infarct. Perhaps all his pain was referred from the pulmonary infarcts. He had them in both lower lobes, and there was an extensive diaphragmatic pleuritis.

DR. JONES: The original pain that sent him into the hospital was in the lower abdomen. That was the one point that he stuck to all the time. It brings out the point that pain arising from the attachment

of the diaphragm can spread over the distribution of the twelfth intercostal nerve. Another point of which I was not aware is that one can occasionally obtain bloody fluid from the pleural cavity in cases of pulmonary infarction.

DR. CASTLEMAN: I should say that 10 or 15 per cent of pulmonary infarcts have associated hemorrhagic pleural fluid.

CASE 31132

PRESENTATION OF CASE

A fifty-three-year-old man was admitted to the hospital because of deep jaundice.

He had been well until fifteen months before entry, when he suffered an acute onset of dull epigastric pain. At about the same time he noticed the appearance of moderate jaundice, dark urine and light-colored stools. A physician gave him "some pills" and the jaundice allegedly disappeared, having been present only about fifteen to twenty hours. The epigastric pain and a feeling of fatigue, however, lasted several days longer.

Following this episode he was well until about five weeks before admission, when a steady epigastric pain recurred and was associated with occasional nausea and vomiting of liquid material that resembled "olive oil." Three weeks before admission he rapidly developed marked jaundice, with dark urine and light-colored stools. The epigastrium was a little "sore" and slightly tender. The degree of jaundice had fluctuated slightly and there were a few bouts of nausea and vomiting. He had no fever, chills or colicky or radiating pains. He stated that he had had black stools for several days about two weeks before admission.

Physical examination revealed a well-developed, well-nourished man in no distress. The skin and scleras were deeply jaundiced. The heart and lungs were not remarkable. The abdomen was not distended and showed no mass or tenderness.

The temperature, pulse and respirations were normal. The blood pressure was 120 systolic, 65 diastolic.

Examination of the blood showed a red-cell count of 3,690,000, with 10.9 gm. of hemoglobin, and a white-cell count of 11,600, with 85 per cent neutrophils. The urine was dark, acid in reaction and had a specific gravity of 1.012. It gave a + test for albumin and a +++ test for bile. The sediment contained a few granular casts. A van den Bergh test was 23.5 mg. per 100 cc. direct, and 32.4 mg. indirect. The stool was olive green and guaiac negative. The prothrombin time was 27 seconds (normal, 18 to 20 sec.). The serum nonprotein nitrogen and total protein were normal, with an albumin-globulin ratio of 1.04.

X-ray examination of the abdomen showed no opaque calculi along the course of the renal or biliary tracts. The lumbar spine was not unusual, and the psoas contours were normal. There was no enlargement of the liver or spleen. The right kidney was thought to be somewhat enlarged.

On the fifth hospital day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. GORDON DONALDSON: In the absence of the x-ray films, we will have to content ourselves with the written report. On x-ray examination, the liver was not enlarged and no evidence of gallstones was seen. The enlargement of the right kidney can be interpreted as being within the limits of normal.

I think that this man had either cancer or calculi obstructing the outflow of bile from the liver, with the odds heavily in favor of stone. A portal or toxic type of cirrhosis seems unlikely in view of his pain, short story, lack of ascites and general well-being. Moreover, a jaundice of the catarrhal type is reasonably well ruled out by the story and physical findings. Catarrhal jaundice does not recur, particularly after a fourteen-month interval.

The jaundice was obstructive in nature and was of the type that was not accompanied with bouts of chills and fever. The pain, moreover, was probably due to whatever caused the obstruction, and not to the liver itself, since a distention of the liver capsule sufficient to cause pain should result in a palpable liver or one seen to be enlarged by x-ray. From the location of the pain one might suspect a gastric or duodenal ulcer, with secondary distortion and constriction of the common duct. Such deforming ulcers, however, are usually of much longer duration and are found in much sicker patients. An obstructing duodenal diverticulum should be mentioned in passing. Obstructing disease in the pancreas is a possibility, but if present, the location and type of pain are unusual. Patients with cancer of the head or body of the pancreas usually have pain in the midback. Cyst of the pancreas is rare but can cause obstruction. Certainly if the obstruction to the flow of bile is strictly pancreatic in origin, one should be able to feel the distended gall bladder on abdominal examination.

Carcinoma of the ampulla of Vater should be given consideration. To be sure, such a lesion rarely causes pain, and when it does it is not in the midepigastrium. Bleeding, however, is a fairly common finding; and in this patient we have a history of black stools and the report of a moderately severe anemia. It is only fair to say that the fecal blood in carcinoma of the ampulla is usually occult. A history of definite jaundice that fades out only to recur does not rule out carcinoma of the ampulla. Such a case was reported here not long ago,* and there

*Case records of the Massachusetts General Hospital (Case 30381). *New Eng. J. Med.* 231:427-429, 1944.

have been others. These patients were mildly jaundiced and then cleared, only to become icteric again one or two months later. The mechanism of this is hard to explain, but it does occur. Local edema, the rate of bile flow and the type of bile have been offered as explanations. Here again, however, if the obstruction were this far down the biliary tree one would expect gall-bladder distention.

Cancer of the gall bladder or upper biliary tree is in the same order of likelihood. In such conditions the patient should be a little less robust than the report leads one to suspect. Primary cholangitis of the stenosing type is unlikely in the absence of chills and fever. Similarly, biliary obstruction from an ascending pylephlebitis has no historical or clinical support.

I shall have to conclude that the operator on opening the abdomen expected to find a slightly enlarged, heavily pigmented liver, a thickened, shrunken gall bladder and a somewhat dilated and edematous common duct. A stone had been passed fifteen months before. Another was probably lodged in the common duct, and more lay in the gall bladder. The epigastric soreness and tenderness were due to this stone. The dark black stools noted on several occasions two weeks before entry probably resulted from erosion by a stone of one of the veins that are so abundant in the common-duct wall. A fistula may have existed between the gall bladder and common duct, but this is unlikely. A prothrombin time, prolonged by obstructive liver damage, prevented early clotting and resulted in the degree of anemia found. Further evidence of the degree of liver damage is found in the lowered albumin-globulin ratio and in the elevated van den Bergh reaction.

DR. RONALD C. SNIFFEN: Dr. Moore, you operated on this case. Will you tell us about your findings?

DR. FRANCIS D. MOORE: An item that might have helped Dr. Donaldson is the fact that the black stools occurred while he was in an outside hospital and while he was receiving iron therapy. They were not guaiac or benzidine positive, and so far as we can make out, he had never had any proved evidence of gastrointestinal bleeding. This is important because gastrointestinal bleeding in cases of common-duct stone is extremely rare, even in the presence of a markedly elevated prothrombin time.

In any event, we expected to find approximately what Dr. Donaldson has described, namely, the changes caused by chronic cholecystitis and cholelithiasis, with a common-duct stone.

The situation was quite different, however, from what we expected. The duodenum, large intestine, stomach, pancreas, gall bladder and common duct were all drawn up into the liver hilus, where they were firmly matted together by an extensive neoplastic and inflammatory process. In attempting to make our way into this, it soon became apparent that whatever tumor was here had invaded the duodenum directly. The gall bladder and bile ducts formed a solid tumor mass, which was biopsied. We could not identify any portion of normal duct above the tumor mass that could be used for anastomosis.

Because of the fact that the duodenum was partially destroyed by the tumor mass, a resection of the distal end of the stomach and the first portion of the duodenum had to be performed. Even this much surgery in the face of a complete and unrelieved biliary obstruction was doomed to terminate fatally. About ten days after the operation, the patient slipped into coma and died quietly, a death that I should characterize as being typical of liver failure or cholemia.

CLINICAL DIAGNOSIS

Cholelithiasis, with common-duct stone.

DR. DONALDSON'S DIAGNOSES

Cholelithiasis, with common-duct stone.
Chronic cholecystitis.
Bile stasis of liver.

ANATOMICAL DIAGNOSES

Colloid carcinoma of gall bladder, with extension to extrahepatic bile ducts and metastases to head of pancreas and regional lymph nodes.
Cholelithiasis.
Bile stasis of liver.

PATHOLOGICAL DISCUSSION

DR. SNIFFEN: When he died the patient was deeply jaundiced. Dr. Moore had resected the distal end of the stomach and proximal portion of the duodenum. This was followed by a gastrojejunostomy and infolding of the duodenal stump. All suture lines were intact, but the proximal end of the duodenum lay in a necrotic mass of fibrinopurulent adhesions. The gall bladder was destroyed by a tumor that was fixed to the surrounding viscera by fibrous adhesions, and its necrotic center contained a 3-by-2-cm. gallstone. The tumor had spread to the cystic and common bile ducts and to both hepatic ducts, leading to complete obliteration of their lumens. The adjacent liver parenchyma was also invaded. The whole mass measured approximately 6 by 4 cm. The head of the pancreas contained a few minute, discrete metastatic nodules. Microscopic sections showed a colloid carcinoma.

The liver was large, weighing 1990 gm., and its surface was smooth and dark green. The intrahepatic bile ducts were distended with bile. Microscopic sections showed a rather severe bile stasis without other abnormalities except for degeneration in the neighborhood of the invading tumor.

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Communications should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston 15, Massachusetts.

SURGERY OVER THERE

The September issue of the *Annals of Surgery* contains a paper by Colonel Edward D. Churchill, who is on leave from the Massachusetts General Hospital while serving as surgical consultant to the North African and Mediterranean Theater of Operations. This paper has been characterized by Brigadier General Rankin as "one of the finest dissertations on the management of wounds which has been submitted through the Office of The Surgeon General of the United States Army." In a foreword to this article General Rankin writes:

> Colonel Churchill has done more than improve the quality of surgery performed in this theater. Uniquely equipped to perform his mission and imbued with the true scientific spirit, he early recognized the inadequacy of certain preformed concepts in the surgical management of the wounded. With this flexibility of mind and with an elastic organization, he has utilized an investigative approach and drawn upon battlefield experience to evolve more rational and effective methods in the surgical care of the wounded. In this article, he has epitomized these observations and principles which constitute not only a contribution to war surgery but also to the advancement of medical science.

Every surgeon interested in the management of traumatic wounds should read this brief paper in the original. Others will get a great deal of satisfaction from reading it and learning of the methods now being employed in the management of severe battle injuries. Dr. Churchill dispels a number of important misconceptions, particularly concerning the role of blood substitutes and of chemotherapeutic agents, including penicillin, in the management of wounds and indicates the greater importance of prompt and adequate surgical treatment. No better comment on this paper could be made than to quote a few excerpts* that are as applicable to traumatic surgery in civilian life as they are to the management of injuries sustained on the battlefield:

> . . . . Plasma alone is not adequate to prepare a seriously wounded casualty to withstand the surgical procedures that are essential, or to carry him through the critical postoperative period. After admission to hospital a limited amount is used to augment the effects of whole blood transfusion. Plasma is a substitute for whole blood only in the sense that it can be packaged and stored in adequate quantity in areas where blood cannot be obtained. Plasma is not a substitute for whole blood in the physiologic sense. . . .
>
> Chemotherapy is initiated in the field by local and oral administration of sulfonamides. The value of this procedure is questioned by many surgeons of experience. Preoperative penicillin therapy is started on all but the lightly wounded casualties on admission to hospitals in the forward area. At operation, topical application of penicillin is carried out only in wounds penetrating the meninges, serous cavities and joints. Parenteral administration is continued beyond the period of the likelihood of infection or until established infection has been controlled. No patient is held in the forward area solely for the purpose of continuing penicillin therapy.
>
> Just as plasma is not a substitute for whole blood in resuscitation, neither are sulfonamides and penicillin substitutes for the surgical excision of devitalized tissue. Chemotherapeutic agents cannot sterilize dead, devitalized or avascular tissue, nor do they prevent the septic decomposition of contaminated blood clot. . . .
>
> In this war there have been two quite different approaches in the application of chemotherapeutic agents to military surgery. The first would utilize these agents to permit delay in wound surgery and minimize the complete-

*Permission to quote these excerpts has been obtained from the copyright owner, J. B. Lippincott Company, Philadelphia.

ness of the excision of dead tissue. The second employs chemotherapy to extend the scope of surgery and achieve a perfection in results previously considered impossible. The latter policy has guided the surgery of the Mediterranean Theater. To reiterate the axiom that penicillin is not a substitute for surgery is not enough. Every surgeon must learn that chemotherapy opens new and startling possibilities in wound management. . . .

Surgeons assigned the responsibility of caring for the wounded in a first priority surgical hospital must be highly trained and experienced, as their tasks are the most exacting of military surgery. . . . If the achievements of surgery in this theater are ever judged noteworthy, they are attributable to the fact that expert rather than inexperienced surgeons are doing the work. All other measures are ancillary items. . . .

It is estimated that during the Italian Campaign alone at least 25,000 soft-part wounds have been closed on the basis of gross appearance only. Healing has resulted in approximately 95 per cent, and no loss of life or limb or serious complications have been reported. . . . The presence of residual dead tissue or established invasive infection at the time of the first dressing is evidenced by discharge of pus and redness and edema of the wound margins. When these are present but minimal, the wound is allowed to "clean up" with moist dressings. Surgical excision of devitalized fragments or removal of retained foreign bodies may speed this process. Secondary closure may then be performed after a few days. If established infection is severe, or if the patient is toxic or anemic, a course of penicillin therapy and blood transfusions is instituted and followed by radical wound revision with staged closure. . . .

The topical use of sulfonamides appears to contribute nothing to the favorable results of reparative wound surgery. Parallel series of closures show as satisfactory or better results without the topical application of sulfonamides at the time of suture as with it. Penicillin therapy is entirely unnecessary as an adjunct to the usual reparative surgery of soft-part wounds. It is used parenterally for cases of established infection and in the reparative surgery of complicated wounds.

The reparative surgery of complicated wounds, including those with extensive muscle damage as well as those with skeletal or joint injury and penetration of the viscera, is a more major undertaking. It is in this group that both the incidence and hazards of infection may be expected to be greater. It is this group of cases that is kept on penicillin therapy during the interval between initial and reparative surgery and so maintained until the likelihood of infection is past. Immediate correction of secondary anemia on arrival at the base is an essential part of the program as the days are few during which the anemia from the initial blood loss may be projected into the anemia of chronic infection and indolent wound healing. The procedures of reparative surgery are frequently of great magnitude and the patients must be adequately supported by whole-blood transfusions, before, during, and subsequent to operation. . . .

The time-lag between wounding and initial surgery referred to as "the golden period" has been greatly reduced by the organization of medical service in the forward area to this end. The time-lag between initial surgery and reparative surgery has now assumed an equal degree of importance. Just as every hour added to the time-lag between injury and initial surgery increases the loss of life and limb, so does every day added to the time-lag between initial and reparative surgery. Four to ten days is "the golden period" to close wounds, reduce and fix fractures, remove retained missiles and carry out other procedures to prevent or abort infection. To fail to take cognizance of the potentialities of early reparative surgery at the base in the future plans and operations will be as unthinkable as a failure to plan for the removal of the wounded from the field of battle. . . .

It is a satisfaction to note the contrast between the present concept of wound management and the doctrines in vogue scarcely a year ago. The closed-plaster management of wounds and fractures was designed to conserve life but exacted a high price in skeletal and soft-part deformity. Its use is now limited to certain cases with established infection of bone or with massive defects of soft parts compounding a fracture site. Recommendations that minimized the necessity for a complete initial wound operation or sought to delay it (wound trimming, "salting down with sulfa drugs" and so forth) accepted suppuration as inevitable in a considerable proportion of cases and relied on chemotherapy to hold sepsis within bounds. Resuscitation measures that relied on plasma alone to compensate for loss of whole blood prolonged life but tied the hands of the surgeon in the performance of life-saving surgery. These and other earlier concepts were but faltering steps toward what will emerge as the ultimate scope of surgery as developed in the present war.

It is apparent from these excerpts that soldiers, at least those in the Mediterranean area, are receiving the best of surgical care, which is reflected in the end results. Furthermore, one can look forward to a generation of well-trained surgeons who have benefited from their experiences and are prepared to practice and to teach others the best methods of wound management.

MASSACHUSETTS MEDICAL SOCIETY

SECRETARY'S OFFICE

The following communication concerning cancellation of the annual meeting of the Massachusetts Medical Society has been sent to the Executive Committee of the Council:

* * *

Dear Doctor:

The Office of Defense Transportation has denied our petition to hold the annual meeting of the Massachusetts Medical Society. This applies equally to the annual meeting of the Council.

These events will, therefore, not be held in 1945.

Dr. Elmer S. Bagnall, President, has ruled that the carrying on of our Society's affairs during this emergency is the obligation of the Executive Committee of the Council.

The next meeting of the Executive Committee has been set for 10:30 a.m., Wednesday, May 23, 1945, at Sprague Hall, 8 Fenway, Boston. The agenda of this meeting will be sent to each councilor well in advance.

On its receipt the president of each District Medical Society should call the councilors of his district together for the purpose of studying it and making determinations with

regard to it, to the end that the executive councilor may come to the meeting in May aware of and fully prepared to express his district's point of view.

The Cotting Luncheon will be served.

Very truly yours,

Michael A. Tighe, *Secretary*

DEATHS

BERGIN — Stephen A. Bergin, M.D., of Worcester, died February 22. He was in his seventy-second year.

Dr. Bergin received his degree from Harvard Medical School in 1900. He was a member of the staff of the St. Vincent Hospital. He was a fellow of the American Medical Association.

His widow, five sons, a daughter and three grandchildren survive.

BUTLER — John E. Butler, M.D., of Taunton, died March 9. He was in his eighty-second year.

Dr. Butler received his degree from Harvard Medical School in 1891. He was a retired Boston specialist in anesthesia.

His widow and a brother survive.

ELIOT — Henry W. Eliot, M.D., of Manchester, Vermont, died October 21, 1944. He was in his seventy-ninth year.

Dr. Eliot received his degree from the University of Vermont College of Medicine in 1898.

His widow survives.

FISHER — John C. V. Fisher, M.D., of West Roxbury, died February 20. He was in his fifty-third year.

Dr. Fisher received his degree from Boston University School of Medicine in 1917. Dr. Fisher served as a surgeon for the United States merchant marine during the first world war. He had practiced in Boston since 1919 and had been obstetrician at Massachusetts Memorial Hospitals since 1928. He was associate professor of obstetrics at Boston University School of Medicine. He was a fellow of the American College of Surgeons, and a member of the New England Obstetrical and Gynecological Society.

His widow and three daughters survive.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

RETURN OF EMPTY VIALS AND OUTDATED BIOLOGIC PRODUCTS

At the onset of the war emergency, the Antitoxin and Vaccine Laboratory was faced with serious difficulties in procuring containers, circulars and other supplies used in packaging biologic products. An appeal was sent out to physicians, boards of health and hospitals to return used packages or containers of biologic products to the laboratory so that these could be re-used. The return of outdated products, which has always been urged, was particularly stressed because of the wartime shortages of supplies and personnel.

The response has been gratifying. Thousands of outdated packages, empty containers and so forth have been returned. The containers have been re-used, and the products have been re-tested. Those products that could be salvaged have been reprocessed and redistributed. These returns have aided tremendously in maintaining the continuity of production and distribution at the laboratory, and this note is sent out to express the gratitude of the laboratory staff and of the department for the fine co-operation and assistance in this salvage program.

The situation regarding supplies and production is getting no better. Returns are needed as badly as ever and will continue to be welcomed. By returning empty containers and outdated products the physician and others not only help the war effort and save the taxpayers additional expense but also help to keep the supply of such products fresh and thus to avoid the risk of using supplies that are outdated.

FLOODS AND TYPHOID VACCINATION

State and local health and welfare organizations, the American Red Cross and other agencies have already anticipated the possibility that serious floods will occur this spring as a result of the heavy snows of the winter. Although the recent extended thaws may have done much to reduce the likelihood of floods, the possibility remains that floods will occur, and plans must be made for handling the emergencies that may arise.

The organization of such programs in recent years has been developed largely in the Mississippi Valley and those of its tributaries — an area where typhoid fever is widespread and fairly prevalent. Consequently the administration of typhoid vaccine on a mass scale to persons in, or refugees from, flooded areas has become a widely accepted practice. In New England, however, the local conditions that prevail should be given serious study before accepting any such procedure simply because it has been widely used elsewhere.

Typhoid fever is a relatively rare disease in New England and consequently the risk of contamination of drinking waters because of floods is exceedingly slight. The application of mass immunization against typhoid fever is, therefore, not warranted in Massachusetts except in situations where there is sound reason to believe that typhoid infection may exist in the water supply in use. This is particularly true with the present shortage of health and medical personnel, for such immunization programs take a great deal of time and effort on the part of trained personnel, whose services may be more urgently needed in other ways. Another consideration is that the vaccine probably will not prevent the disease in persons already exposed by flood conditions.

If it is decided that vaccination is necessary, the program may be simplified by bearing in mind the value of a single dose of vaccine for anyone who has previously been vaccinated against typhoid fever. Such persons will obtain sufficient protection by receiving one dose of typhoid vaccine, given either as 0.5 cc. subcutaneously or as 0.1 cc. intradermally.

COMMUNICABLE DISEASES IN MASSACHUSETTS FOR FEBRUARY, 1945

Résumé

Diseases	February 1945	February 1944	Seven-Year Median
Anterior poliomyelitis	3	0	0
Chancroid	1	3	*
Chicken pox	1340	2755	1607
Diphtheria	17	26	11
Dog bite	497	575	531
Dysentery, bacillary	9	12	12
German measles	118	188	89
Gonorrhea	303	390	326
Granuloma inguinale	—	0	*
Lymphogranuloma venereum	3	1	*
Malaria	53	46	1
Measles	305	1876	1876
Meningitis, meningococcal	26	55	8
Meningitis, Pfeiffer-bacillus	3	2	1
Meningitis, pneumococcal	1	9	†
Meningitis, staphylococcal	0	0	†
Meningitis, streptococcal	0	1	†
Meningitis, other forms	0	0	†
Meningitis, undetermined	3	15	†
Mumps	1888	1091	823
Pneumonia, lobar	241	356	477
Salmonella infections	4	1	2
Scarlet fever	1200	1769	1211
Syphilis	351	456	374
Tuberculosis, pulmonary	202	266	176
Tuberculosis, other forms	13	24	14
Typhoid fever	2	2	5
Undulant fever	1	1	3
Whooping cough	595	340	658

*Made reportable in December, 1943.

†Pfeiffer-bacillus meningitis only other form reportable previous to 1941.

Comment

Mumps is quite prevalent though not up to the February record of 1942 and 1936. However, the number of cases is somewhat more than twice that representing the seven-year median.

Lobar pneumonia is again at a low point, the lowest on record for the month of February. The number of cases is approximately half that of the seven-year median.

Measles is at the lowest level reported for the month of February since 1907.

Scarlet fever shows a marked drop over the January record, and now is at about the seven-year average.

Pulmonary tuberculosis is tending to decline once more in spite of widespread case-finding activities.

Geographical Distribution of Certain Diseases

Anterior poliomyelitis was reported from: Boston, 1; Groveland, 1; Newton, 1; total, 3.

Diphtheria was reported from: Boston, 1; Framingham, 1; Hingham, 1; Lawrence, 1; Lowell, 1; Malden, 3; Medfield, 1; New Bedford, 3; Northampton, 1; Sharon, 1; Taunton, 1; Worcester, 2; total, 17.

Dysentery, bacillary, was reported from: Gloucester, 1; Lexington (Metropolitan State Hospital), 7; Worcester, 1; total, 9.

Encephalitis, infectious, was reported from: Watertown, 1; total, 1.

Lymphocytic choriomeningitis was reported from: Swampscott, 1; total, 1.

Malaria was reported from: Arlington, 1; Boston, 3; Cambridge, 1; Camp Edwards, 24; Cushing General Hospital, 5; Framingham, 1; Hingham, 1; Somerville, 2; Southboro, 1; Walpole, 1; Waltham (Regional Hospital), 12; Weymouth, 1; total, 53.

Meningitis, meningococcal, was reported from: Ashland, 1; Attleboro, 1; Boston, 9; Bridgewater, 1; Brockton, 1; Cambridge, 2; Chicopee, 1; Fitchburg, 1; Haverhill, 1; New Bedford, 1; Newton, 3; Springfield, 1; Taunton, 1; Westboro, 1; Worcester, 1; total, 26.

Meningitis, Pfeiffer-bacillus, was reported from: Brockton, 1; Everett, 1; Springfield, 1; total, 3.

Meningitis, pneumococcal, was reported from: Worcester, 1; total, 1.

Meningitis, undetermined, was reported from: Braintree, 1; Palmer, 1; Worcester, 1; total, 3.

Salmonella infections were reported from: Arlington, 1; Boston, 2; Revere, 1; total, 4.

Septic sore throat was reported from: Boston, 15; Newton, 1; Williamstown, 1; total, 17.

Trichinosis was reported from: Boston, 2; total, 2.

Typhoid fever was reported from: Adams, 1; Chicopee, 1; total, 2.

Undulant fever was reported from: Hampden, 1; total, 1.

CONSULTATION CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

Clinic	Date	Clinic Consultant
Salem	April 2	Paul W. Hugenberger
Haverhill	April 4	William T. Green
Lowell	April 6	Albert H. Brewster
Brockton	April 12	George W. Van Gorder
Pittsfield	April 16	Frank A. Slowick
Springfield	April 18	Garry deN. Hough, Jr.
Worcester	April 20	John W. O'Meara
Fall River	April 23	Eugene A. McCarthy
Hyannis	April 24	Paul L. Norton

MISCELLANY

NOTES

Dr. Joseph T. Wearn, at one time associate professor of medicine, Harvard Medical School, and associate director, Thorndike Memorial Laboratory, and visiting physician, Boston City Hospital, has recently been appointed dean of Western University School of Medicine, succeeding Dr. Torald H. Sollmann, who retired last July. Dr. Wearn will continue as professor of medicine and director of the Department of Medicine, Lakeside Hospital, positions that he has held for a number of years.

The following appointments have recently been made to the teaching staff of the Harvard Medical School: Nicolau Moraes Barros, of Sao Paulo, Brazil (S.B. Liceu Rio Branco 1929, M.D. University of Sao Paulo 1935), research fellow in surgery and fellow of the Rockefeller Foundation; Richard Adolph Bloomfield, of Philadelphia (A.B. Harvard University 1933, M.D. Harvard University 1938), assistant in medicine; Thomas Clark Chalmers, Jr., of New York City (M.D. Columbia University 1943), research fellow in medicine; Felix George Fleischner, of Brookline (M.D. University of Vienna 1919), instructor in radiology; Erwin Leopold Jungherr, of Storrs, Connecticut (D.V.M. University of Vienna 1922), special research assistant; Janet Ward McArthur, of Bellingham, Washington (A.B. University of Washington 1935, S.B. University of Washington 1937, M.D. Northwestern University 1942), research fellow in medicine; William Joseph Mulligan, of Springfield, Massachusetts (A.B. American International College, Springfield 1937, M.D. University of Vermont 1941), assistant in obstetrics; William Daniel Murphy, of San Francisco, California (A.B. Leland Stanford, Jr. College 1937, M.D. Stanford University 1941, M.P.H. Johns Hopkins University 1942), research fellow in medicine; Lionel Everard Napier, of Calcutta, India (F.R.C.P. London), visiting lecturer on tropical medicine; John Thayer Quinby, of Boston (A.B. Harvard University 1934, M.D. Harvard University 1939), assistant in medicine; and Martin Herman Wittenborg, of Boston (A.B. Harvard University 1935, M.D. Johns Hopkins University 1939), research fellow in radiology.

CORRESPONDENCE

RAPID DIAGNOSIS OF SMALLPOX

To the Editor: I have read with interest the editorial comment in the February 1 issue of the *Journal* on the work of Majors van Rooyen, Illingworth and Oliver, of the Royal Army Medical Corps. Certainly, if the conclusions put forward by these physicians are valid, they have made a major contribution to our knowledge of the vagaries of smallpox and, in addition, have added to our diagnostic armamentarium.

When I first read the report describing their methods for diagnosing smallpox on the basis of characteristic elementary bodies found in smears from the skin lesions, I was quite impressed but wondered whether the clinical criteria for the diagnosis of smallpox were adequate, despite the statement that appears in the text, "Every positive laboratory diagnosis was subsequently confirmed clinically." When the article by Majors Illingworth and Oliver, describing their clinical findings in smallpox in the Middle East came to my attention, however, it seemed that there was considerable room for skepticism concerning the accuracy of the diagnostic laboratory test, because it was apparent that most of the material on which the original report was based consisted of a group of so-called "atypical smallpox": they state,

"In short, there was no single point, other than a positive vesicular scraping, which was entirely reliable for diagnosis."

I do not wish to dispute the facts that both smallpox and chicken pox can run very atypical courses and that at times each disease mimics the other, but I hesitate to accept as valid the findings of a new test to differentiate these two diseases when most of the evidence supporting the specificity of the test is based on the study of atypical cases of smallpox, which, except for the findings of the test, would have been called chicken pox.

I would be the first to admit that smallpox can occur in the vaccinated individual, but it is difficult to accept the diagnosis of smallpox in the series of 100 cases studied when all but 4 patients had been previously vaccinated and when 70 had been successfully vaccinated within a two-year period before onset. It is possible that what was read as an immune reaction to smallpox vaccination really represented a feeble response to impotent vaccine. In that event, of course, these persons were not successfully vaccinated. Furthermore, in contrast to the clinical description by these authors of mild smallpox, what little knowledge we do have of second attacks of the disease in the same person and bona-fide cases in vaccinated persons, indicates that, although the disease may be mild, the distribution of the lesions and their description, except for their number, do not differ strikingly from those occurring in the unmodified disease.

I approach this whole subject very much as a layman, since my knowledge of the laboratory aspects of the problem, as well as that of clinical smallpox, is meager. I do think, however, that my argument is pertinent and that additional evidence is needed before one can assume, on the one hand, that the 100 cases of smallpox described from Egypt actually were not, to a large extent, due to chicken pox and, on the other hand, that this interesting diagnostic test does clearly differentiate the two diseases. I intend to write the authors for additional information, but since your editorial has just come to hand, I thought it worth while putting my thoughts on paper for transmittal to you.

ROBERT F. KORNS, M.D.
Epidemiologist
State of New York Department of Health
Division of Communicable Diseases
Albany 1, New York

* * *

In the article by Majors Illingworth and Oliver one assumes that the difficulty in clinically recognizing the cases of smallpox was in the early stage, when they exhibited either the so-called "modified form," as a result of previous vaccination, or the violent hemorrhagic form, the onset of which sometimes suggests measles or typhus fever. Since these authors state that the positive findings in the scrapings of the early lesions were subsequently confirmed clinically, it appears that the later course of the disease established the diagnosis of smallpox. In addition, some of the more time-consuming laboratory tests may have been employed. As Dr. Korns points out, it is somewhat difficult to rationalize so many cases of smallpox, many of which were severe, in persons who had been successfully vaccinated. Possibly the "success" of the previous vaccinations, as he suggests, should be questioned, since it is well known that, for obvious reasons, vaccine virus stored in the subtropics and tropics is likely to lose its potency rapidly. Furthermore, even 96 cases in vaccinated persons are not particularly surprising when one considers the enormous number of troops that must have passed through this smallpox-infested country at the time that these observations were made. Certainly, any laboratory method by which it is claimed that smallpox can be rapidly differentiated from chicken pox deserves comment to ensure further study by other investigators. — ED.

NOTICES

NEW ENGLAND HEART ASSOCIATION

The Henry Jackson Lecture of the New England Heart Association will be held at the Boston Medical Library on Monday, April 16, at 8:15 p. m. Professor Dr. Teosilo Ortiz Ramirez will speak on the subject "Heart Disease in Mexico, and the New National Institute of Cardiology."

Interested physicians and medical students are cordially invited to attend.

JOSEPH H. PRATT DIAGNOSTIC HOSPITAL

Bennet Street, Boston
Lecture Hall, 9–10 a.m.

MEDICAL CONFERENCE PROGRAM

Wednesday, April 4 — The Problem of Splenic Hemolysis. Dr. K. Singer.

Friday, April 6 — Measurement of Hepatic Blood Flow. Dr. Stanley Bradley.

Wednesday, April 11 — The Present-Day Concept of Streptococci and the Diseases Which They Produce. Dr. L. Weinstein.

Friday, April 13 — The Diagnosis of Infections Due to Filterable Viruses. Dr. C. A. Janeway.

Wednesday, April 18 — Penicillin in Venereal Disease. Dr. Oscar F. Cox.

Friday, April 20 — Advances in Naval Medicine. Rear Admiral J. J. A. McMullin.

Wednesday, April 25 — Treatment of Dermatoses. Dr. John G. Downing.

Friday, April 27 — New Compounds for the Treatment of Hyperthyroidism. Dr. E. B. Astwood.

On Monday mornings (except April 9) clinics will be given by Dr. Samuel Proger. On Tuesday and Thursday mornings Dr. S. J. Thannhauser will give medical clinics on hospital cases. On Saturday mornings clinics will be given by Dr. William Dameshek.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING THURSDAY, APRIL 5

FRIDAY, APRIL 6

*9:00–10:00 a.m. Medical clinic. Isolation Amphitheater, Children's Hospital.

10:50 a. m. Common Lesions of the Hand. Dr. Bernard Appel. (Postgraduate clinic in dermatology and syphilology.) Amphitheater, Mallory Building, Boston City Hospital.

SATURDAY, APRIL 7

*10:00 a.m.–12:00 m. Medical staff rounds. Peter Bent Brigham Hospital.

MONDAY, APRIL 9

*12:00 m.–1:00 p.m. Clinicopathological conference. Peter Bent Brigham Hospital.

TUESDAY, APRIL 10

*9:00–10:00 a.m. Medical clinic. Infants' Hospital.

*12:15–1:15 p.m. Clinicoroentgenological conference. Peter Bent Brigham Hospital.

WEDNESDAY, APRIL 11

*12:00 m. Clinicopathological conference. Children's Hospital.

*12:00 m.–1:00 p.m. Clinicopathological conference. Cambridge Hospital.

7:15 p.m. Graduate seminar in pediatrics. Children's Medical Service, Amphitheater 3A, Massachusetts General Hospital.

*Open to the medical profession.

APRIL 4–27. Joseph H. Pratt Diagnostic Hospital. Medical conference program. Notice elsewhere on this page.

APRIL 5. New England Hospital for Women and Children. Page 364, issue of March 22.

APRIL 11. Tufts Medical Alumni Association. Page 364, issue of March 22.

APRIL 11. New England Dermatological Society. Page 364, issue of March 22.

APRIL 12. Progress in Dermatology as a Result of World War II. Dr. John G. Downing. Pentucket Association of Physicians. 8:30 p.m. Haverhill.

APRIL 16. New England Heart Association. Notice elsewhere on this page.

APRIL 30. New York Institute of Clinical Oral Pathology. Page 334, issue of March 15.

JUNE 14–19. American Board of Obstetrics and Gynecology. Page 364, issue of March 22.

SEPTEMBER 17. American Public Health Association. Page 752, issue of November 30.

DISTRICT MEDICAL SOCIETIES

PLYMOUTH

APRIL 26. Toll House, Whitman.
MAY 17. Lakeville Sanatorium, Lakeville.
Meetings will be held at 11 a.m.

WORCESTER

APRIL 11. Hahnemann Hospital, Worcester.
MAY 9. Annual meeting.